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ABSTRACT

The Science Communication section of the Proceedings contains the following seven papers: "Getting an Advance Look: Controversies over Embargoes in Science Journalism" (Vincent Kiernan); "Perceptions of Newspaper Bias in a Local Environmental Controversy" (Katherine A. McComas; Clifford W. Scherer; Cynthia Heffelfinger); "Newspaper Economic Coverage of Motor Vehicle Emissions Standards" (David C. Coulson and Stephen Lacy); "Connecting Theory and Practice: Are Counterstereotypes Effective in Changing Girls' Perceptions of Science and Scientists?" (Jocelyn Steinke); "Does Media Framing Keep Population Off the Public Agenda?" (T. Michael Maher); "An Elite Scientist at the Boundary: The Power of Evidence and the Evidence of Power in Media Coverage of Science" (Linda Billings); and "Community Structure and Mass Media Accounts of Risk" (Sharon Dunwoody and Robert J. Griffin). Individual papers contain references. (RS)

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SCIENCE COMMUNICATION

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Getting an Advance Look Controversies over Embargoes in Science Journalism

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Abstract

A key feature of modern science reporting is the embargo that controls the timing of reporting of findings from many journals and conferences. Using primary source material, this paper traces the evolution of science journalists' views on this controversial practice from the 1920s to the present. Despite complaints by journalists that the embargo gives scientists a high degree of control over journalists, the embargo system developed at the active instigation of journalists and persists because of the continuing support of journalists.

Getting an Advance Look: Controversies over Embargoes in Science Journalism

Every week, from Tuesday night through Friday, newspapers and television news reports usually include a burst of news stories about the latest findings in science being published in scientific journals. Almost always, these include a few stories about the latest medical research. Often there also are stories about new discoveries in non-medical fields such as astronomy, chemistry and physics.

The regularity of these news reports and their consistent timing from week to week is easy to explain: Several major weekly scientific and medical journals provide copies of their issues to science journalists under what is known as an "embargo." The journalists are granted advance access to the papers in the journal so long as they agree not to publish the information until a preset time. The arrangement is intended to give science journalists extra time to research and prepare stories on complex technical topics, but it also appears to draw media attention to the journals that provide embargoed materials. The journals that are most frequently quoted in the general press -- such as *Science*, *Nature*, the *Journal of the American Medical Association* and the *New England Journal of Medicine* -- all provide embargoed materials to extensive numbers of science journalists. Scientific societies also provide embargoed copies of papers to be presented at scientific meetings; frequently, these papers are not made available to paying attendees.

What is less easy to explain is the durability of the embargo system among journalists for whom competition with other journalists is a stated norm of professional behavior. This paper seeks insights into this issue by tracing the historical development of journalists' attitudes toward the embargo system from its genesis in the 1920s to the present. Historians of mass communication have devoted little attention to embargoes in science news. In his history of the origins of science journalism in the United States, Krieghbaum[1] describes early attempts by science writers to obtain advance copies of papers to be presented at conferences in the 1920s and 1930s, but he does not address embargoes on journals. Similarly, in her history of the National Association of Science Writers, Hay[2] touches briefly on conference embargoes but does not address journal embargoes.

The present study is a first step toward an examination of science journalists' attitudes toward the embargo system. The research question for this paper is to examine the historical development of journalists' attitudes toward embargoes on science news from the inception of the embargo system to the present. Such an historical understanding may provide insights into why the embargo system came into existence, why it persists, and whether it will survive in an era of new forms of mass communication.

Methods and Data

The principal set of primary source materials used in this project are the archives of the National Association of Science Writers, a professional society of science journalists that was formed in 1934. The archives, held at Cornell University, include correspondence, minutes of meetings, and texts of speeches delivered by members. Most notably, the archives include a complete set of the association's newsletter, which was started in 1952 and which often included discussions of professional issues including embargoes on science news.

Two other sets of primary materials were used to shed insights on specific historical eras. One was the archives of Science Service, a not-for-profit organization founded in 1921 to disseminate science news to news media and a major force in shaping science journalism in the ensuing decades. These archives, held at the Smithsonian Institution, include correspondence between journalists at Science Service and scientists as the journalists sought embargoed access to scientific material. These materials were used to shed light on the attitudes of science journalists in the 1920s and 1930s, prior to the formation of the National Association of Science Writers.

The second auxiliary set of primary materials was the archives of Samuel Goudsmit, editor of the scientific journal *Physical Review Letters* from 1958 to 1974. This archive, held at the American Institute of Physics in College Park, Maryland, includes memorandums and correspondence with scientists and journalists on the issue of publicizing scientific research in mass media prior to publication in a scientific journal. Materials used in this study from this archive dealt with a rule imposed by that journal from 1960 through 1976 that prohibited scientists from publishing a paper in the journal if it had already been publicized in news media.

These primary materials were supplemented by other published materials that would provide insight into the attitudes and professional values of science journalists, including opinion pieces, texts of speeches, autobiographies and texts on science writing.

First Attempts: The 1920s

The origins of the embargo system are unclear, but it appears that the first journal embargo was a cooperative arrangement in the 1910s or 1920s between Morris Fishbein, the flamboyant and politically powerful editor of the *Journal of the American Medical Association*, and Howard W. Blakeslee, a Chicago-based reporter for the Associated Press.[3] Blakeslee, who later would be AP's first science editor, visited the AMA's Chicago headquarters each week to read page proofs of the impending issue of the journal; it is unclear when the practice started, but some bounds can be placed from the fact that Blakeslee had left Chicago by 1928. Fishbein's autobiography suggests that Blakeslee instigated the arrangement: "When Howard Blakeslee was assigned to Chicago by the Associated Press, he had arranged to come each Thursday to AMA headquarters where I conferred with him and pointed out all new scientific developments".[4] Certainly, Blakeslee was skilled at insinuating himself into scientific circles, as Kent Cooper, general manager of the AP from 1925-1948, noted about Blakeslee in his own autobiography: "Besides being a good reporter, he was friendly and diplomatic with the scientific and medical men upon whom he knew he had to rely. He got acquainted with them first as friends, and on the basis of friendship he got them to talk."[5] It is unclear how and when the embargo migrated from the *Journal of the American Medical Association* to other journals; this is an area requiring further historical research.

However, the origin of embargoes at scientific conferences -- a more important source of science and medical news in the early days of science reporting than today -- is clearer. In 1923, James T. Grady, public information officer of the American Chemical Society, set an important precedent for the role of embargoes in disseminating conference news. Grady obtained advance copies of scientific papers to be presented at the chemical society meeting and distributed news releases about the papers in advance of the meeting under an embargo.[6]

Another influential force for embargoes in early science journalism was Science Service, a not-for-profit news agency founded in 1921 with financial support from E.W. Scripps in an effort to promote wider popular understanding of science. Science Service distributed news stories to subscribing newspapers by mail and telegraph, and the founding editor, Edwin E. Slosson, made clear from the very beginning that Science Service planned to arrange for extensive embargoed access to scientific reports. In his discussions with scientists, Slosson repeatedly linked this access to the goal of wider appreciation of science, which he argued both was a social good in itself and would promote wider support for science in US society. For example, in his announcement of the formation of Science Service, Slosson wrote that

> in a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic government as well as the prosperity of the individual may be said to depend upon the ability of the people to distinguish between real science and fake, between the genuine expert and the pretender... The editor of Science Service desires to receive advance information of important researches approaching the point of publicity in order to arrange for their proper presentation in the press.[7]

Slosson made this point as well in letters to leaders of scientific organizations, in which he sought advance access to scientific papers and publications, linking that to the institution's own self-interest. For example, in one February 1921 letter to John C. Merriam, president of the Carnegie Institution of Washington, Slosson requested that Science Service be supplied with extensive advance information about the institution's activities, such as proof sheets of forthcoming publications.[8] In a subsequent letter to the institution, Slosson makes clear the scientists' interest in supporting embargoes: "The only way to prevent the misinterpretation of the announcements of a scientific discovery is to have prepared in advance for simultaneous release a popularly written explanation of its meaning and significance."[9]

Science Service in turn provided its subscribing newspapers with news reports under embargo. Its first such embargoed story reported details of a paper scheduled for presentation to the National Academy of Sciences , so the story was embargoed for release in morning editions of April 27, 1921.[10]

One concrete step that Science Service took to promote embargoes was to request advance copies of papers from all presenters at the annual conference of the American Association for the Advancement of Science in December 1921 in Toronto. One copy went to

Science Service so that their reporters could produce embargoed stories on the conference; the other copy was given to the local publicity chairman.[11] The value for journalists of having embargoed access to these scientific papers was starkly illustrated a year later, in 1922, when *New York Times* reporter Alva Johnston used such access to produce news coverage of the conference that won a Pulitzer Prize in 1923.[12] The embargo system developed by Science Service continues in a modified form today, at meetings both of the AAAS and of many other scientific societies.

Lobbying by Journalists: The 1930s and 1940s

For the embargo to work, scientists had provide texts of their papers in advance, but initially few did. For example, at the December 1933 annual convention of the AAAS, only about one-fifth of the scientists submitted papers in advance for press use.[13] Thus, after 12 leading science journalists established the National Association of Science Writers in 1934, the organization's leaders set themselves the task of hectoring scientists into providing those advance copies.

For example, David Dietz, science editor of Scripps-Howard Newspapers and a former president of NASW, told the 1936 AAAS conference that advance copies were essential for high quality news coverage of the meeting.

> Each day, there are some twenty or thirty sectional meetings in session. The important papers on any day may be read in various sections meeting in widely separated buildings. Even if all the papers in which a particular newspaperman was interested were read in one meeting, the time element would still have to be taken into consideration. A reporter cannot sit through a long session, return to his typewriter and still get his account into the day's newspapers. He must have the papers in advance.[14]

The journalists' interest in getting advance copies was strengthened after five science reporters -- Dietz, Blakeslee, Gobind Behari Lal of Universal Service, William L. Laurence of the *New York Times*, and John J. O'Neill of the *New York Herald Tribune* -- shared a Pulitzer prize in

1937 for their coverage of a 1936 science conference marking the tercentenary of Harvard University. Harvard officials had aided the reporters immensely, including providing advance copies of papers and arranging press conferences with speakers.[15]

Laurence later told an oral historian that the embargoed materials were the key to his coverage. "When I got there I got a package of about 70 papers -- a regular encyclopedia -- given to me, together with very fine interpretations, [or] summaries, because some of them were very technical papers written by the Harvard faculty. And that helped me no end. Otherwise I couldn't have covered it."[16] Laurence spent each day of the conference writing news stories for the *Times* based on the advance texts as well as information from press conferences and interviews. It is unclear from his comments whether Laurence spent any time at all in actual conference sessions.

Some leaders of the scientific community also supported embargoed science news. For example, Austin Clark, head of the Smithsonian Institution -- and an observer at the founding meeting of the NASW -- organized a press room for conferences of the American Association for the Advancement of Science in which advance texts were distributed to journalists. Clark believed that it was in science's own institutional self-interest to help journalists publicize scientific findings, as he argued in an article titled "Science Progress through Publicity" in one of the AAAS' journals, Scientific Monthly. Clark warned that

> unless any given group within a social unit is recognized as contributing to the material or spiritual welfare of that unit, sooner or later it will be in danger of elimination.... Our duty to the community in which we live, to science, and to ourselves is to take the public completely into our confidence and to provide the interpreters -- the science writers -- with all the material they can use.[17]

The public hectoring by journalists even extended to advice on how scientists should write abstracts of their papers in order to better catch a journalist's eye. Herbert Nichols, science editor of the *Christian Science Monitor* and president of NASW, confided to scientists in 1947 in the journal *Scientific Monthly* that science journalists were assigning letter grades to the abstracts -- and he warned that those with poor grades got little news coverage. "In the A.A.A.S., it is frequently difficult for the press to find enough in the abstracts to meet its need. Too many speakers send in no abstract at all, furnish only the title, or write a single sentence intended either to discourage the reporter or cause him to seek out the author." [18]

Progress in converting scientists was slow. In 1949, Barrows Colton, president of the NASW and a staff writer at *National Geographic*, wrote a lengthy article in the journal *Scientific Monthly* to explain in detail how deadlines work for morning and evening newspapers -- and hinting that scientists might regret it if they didn't provide advance copies of their papers.

> It is of vital importance that speakers at scientific meetings provide complete copies of their papers in advance to the press, if possible at least 24 hours ahead of the time of delivery. Then the reporter can write his story at some leisure, with all the facts before him, and he has time to seek out the speaker for additional particulars if necessary. If he has no copy of the paper, he must try to waylay the speaker whenever and wherever he can to learn what he is going to say, bothering him perhaps at inconvenient times, and making hasty notes that are far less satisfactory than a copy of the paper, and more likely to result in an inaccurate or incomplete story. [19]

Scientific Associations Respond: The 1950s

The hounding from journalists did the trick. Scientific associations began assembling advance information for journalists who were planning to cover their conferences, and scientists increasingly cooperated by submitting papers and abstracts. In 1956, for example, the American Medical Association began sending journalists advance abstracts of papers to be presented at its annual meeting, and the conference's press room was equipped with a photocopier to duplicate the full texts of papers. [20] By the following year's conference, AMA staff had devised a numbered index for conference papers so journalists could locate them more easily. [21]

Similarly, the American Association for the Advancement of Science had begun distributing extensive advance information about its annual conference to journalists. For its 1957 meeting in Indianapolis, the association notified journalists from the home cities of all speakers at the conference as well as the speakers' universities, companies or agencies. A press room distributed texts and abstracts of papers, and the head of public relations for the conference estimated that print journalists alone filed 100,000 words of news coverage during the week long event.[22]

The fact that embargoes were fast developing into the rule rather than the exception was well illustrated by science journalists' anger over a 1955 incident in which the University of Michigan released a long-awaited study on the efficacy of the Salk polio vaccine without providing embargoed copies in advance. Arthur Snider, science writer for the *Chicago Daily Tribune*, recalled that

> they loosed cries of anguish on learning that they would be given the highly secret Francis report at the same time as the hundreds of general assignment reporters. As science writers, they felt that they were entitled to the privilege of advance perusal before being obliged to transmit their stories in a matter of minutes -- a strange change of attitude from their police reporting days when they covered stories under much greater handicaps.[23]

With the wider availability of embargoed information -- particularly at scientific conferences -- journalists began to find themselves in conflict with one another over who would benefit from the terms of the embargo. Initially, these conflicts pitted evening newspapers against morning papers. For example, a 1953 conference of the American Psychiatric Association in San Francisco was disrupted when the editor of an evening paper ordered his reporter to file stories on presentations the evening before they were to be made. Other journalists at the conference banded together to deny the paper any scoops. "It got back into line."[24]

Throughout the 1950s, members of the National Association of Science Writers complained about problems with embargo release times and debated what to do about the problem. The organization surveyed its members in 1954 on the issue; tellingly, survey questions were limited to the time at which embargoes on conference news should be lifted and did not seek opinions on whether advance news should be provided at all. Based on the survey, NASW recommended that conference papers delivered before 1 p.m. should be released for coverage in afternoon newspapers that same day; presentations later in the day should be held for the next day's morning editions. NASW also declared that "extraordinary news" should be publishable as soon as announced but studiously avoided defining the term, explaining that "social pressures would restrain many reporters from using the 'extraordinary' news plea too frequently."[25]

However, this did not settle the problem. Disputes among journalists again erupted into public at a 1959 seminar for science writers sponsored by the American Cancer Society, when the *Chicago Tribune* decided to violate embargo times on papers presented to the writers by researchers. In a statement published in the paper, *Tribune* editor Don Maxwell accused other journalists of agreeing to "hold back reports of important medical discussions as long as 24 hours." The cancer society tried to expel Roy Gibbons, the *Tribune* reporter at the conference.[26]

New Conflicts: The 1960s

A new theme in disputes over release of scientific findings started about 1960, when Samuel Goudsmit, editor of *Physical Review Letters*, a physics journal, began to fret that mass media were reporting scientific reports before they had been vetted through peer review. He also worried that such media reports also undercut the rationale for the journal's own existence. Goudsmit declared to his readers that he would refuse to publish any paper that already had been publicized in the mass media:

> Scientific discoveries are not the proper subject for newspaper scoops. Formerly crackpots often made the front page with their spectacular stories, and this still happens occasionally. We are sure that our authors do not wish to be confused with these pseudo-scientists in the minds of the public. This can be avoided by using the right publicity channels which will give these stories an authoritative stamp of reliability and the proper dignity.[27]

Goudsmit later would claim that science journalists had fully supported his policy[28], and, indeed, several science journalists interviewed in 1964 for Mary Paul Paye's doctoral dissertation voiced support for the policy. For example, Ann Ewing of Science Service told Paye that journalists could risk publishing invalid scientific findings by publishing stories before peer review by a journal was complete. "The time cut is not worth the possibility of inaccuracy," she said.[29]

Nonetheless, Goudsmit's stand immediately caused problems for science journalists seeking to cover scientific discoveries made by space probes launched by the National Aeronautics and Space Administration. Tensions already were high between science journalists and a variety of government agencies that were pursuing high-profile scientific endeavors at public expense, such as NASA, the National Science Foundation and the National Institutes of Health. NASA, for example, was legally mandated to disseminate information on its discoveries, but journalists complained that the agency instead controlled its scientists so tightly that most information was stifled.[30]

The journal editors' insistence that they would not publish scientific findings that had been disseminated in the public press gave NASA scientists an additional rationale to postpone public release of scientific data and findings. However, Robert C. Toth of the *Los Angeles Times* raised a new argument in favor of immediate release: the research was publicly funded and therefore should be open to public scrutiny. At his insistence, NASA officials agreed to a compromise.

Major findings, such as the first photograph of the back side of the moon, would be released to the news media immediately even before submission to a journal. Lesser findings would be submitted first to the journal *Science*, and they would be released to the press as soon as the journal accepted them for publication, without waiting for the actual scientific publication to occur. "I guess we've gotten something of a victory, if it holds up," Toth concluded.[31] However, NASA's embrace of the embargo system could instead be seen as part of a larger public-relations strategy, identified by Lewenstein[32], to direct science journalists' attention toward NASA's scientific accomplishments and away from management and political issues at the space agency. Lewenstein argues that this strategy left journalists unprepared to cover management problems at NASA when the explosion of the shuttle Challenger would make them painfully evident two decades later.

By the 1960s, science journalists shared a widespread -- and apparently uncritical -- acceptance of journal and conference embargoes. For example, a 1963 textbook on science writing advised budding science journalists:

> As your knowledge of science increases and your circle of contacts grows, you learn of more and more developments that you want to report right now. But you will run up against an old scientific law -- the scientist must report to his peers, either at a scientific meeting or through a scientific journal, before reporting to the public through the mass media. The only thing you can do now is abide by the law, no matter how much you may dislike it.[33]

Use of embargoed material became so widespread that by 1965, a journalist could write that, at scientific conferences, "one of the biggest headaches in pressrooms is the 'textual deviate.' This is the scientist who makes an advance text of his talk available days ahead of time, then gets up at the meeting and talks off the cuff."[34]

But as evening newspapers began to die off and newspaper science journalists began to see television journalists as their principal professional competitors, arguments over embargo-release times turned to whether television or newspapers should be favored by the release times. The 1967 conference of the American Association for the Advancement of Science in New York was particularly rancorous on this score. "Television repeatedly broke these times in New York while many writers tried to observe them. We faced a mild chaos," wrote Robert Cowen, NASW president and science editor of the *Christian Science Monitor*.[35] Three months later, representatives of the NASW and AAAS met to try to prevent further problems. The journalists' proposals included an expansion of the embargo system, under which papers would be distributed two weeks in advance of the meeting and "textual deviates" would notify journalists in the pressroom that they had departed from their texts. The issue of television journalists violating the embargo times apparently was not discussed.[36]

At this time, science journalists were beginning to complain bitterly about the tactics used by scientists and commercial public relations firms to manipulate news coverage, including embargoes. But these complaints never cited embargoes on journals or conference papers, which suggests that journalists did not recognize -- or chose not to recognize -- the public-relations value that these embargoes served for journal publishers and conference organizers.

For example, in 1963, one of the architects of the embargo system -- Watson Davis of Science Service, who had argued so forcefully at the 1937 AAAS meeting for advance access to scientific papers -- was complaining that companies and advocacy groups such as the American Cancer Society were using public-relations tactics such as embargoes in a "Madison Avenue approach" to selling science. Issuing material under an embargo, he complained, "even though the information is not too new and pertinent, forces the science writer or editor to give more attention that he otherwise would to an announcement for fear that other newspapers will issue a report and he will be left in the lurch." [37] But Davis does not cite journal or conference embargoes in his complaint.

Three years later, an article in the newsletter of the National Association of Science Writers asked "Are Science Writers Suckers?" The author argued that "we science writers are a bunch of patsies. Most of us have been suckered into an uncritical acceptance of anything we are told by our authorities."[38] Like Davis, Pierce apparently did not conceptualize journal embargoes as a public relations tactic by journal publishers.

It was well understood by journalists and public-relations officials that journalists were not bound by embargoes on scientific studies if they had independently obtained the same information from non-embargoed channels. When a journalist did acquire such information independently, a public-relations official sometimes could persuade the journalist to hold the story anyway; but the cooperative journalist then ran the risk that yet another journalist would also stumble across the story and score a scoop of his or her own. That is exactly what happened in 1964, when news leaked out about the discovery of a subatomic particle called the J particle before a press conference scheduled by the American Institute of Physics to announce the discovery. The day before the press conference, Earl Ubell, science editor of the *New York Herald Tribune*, notified Audrey Likely, the head of public relations for the American Institute of Physics, that he had independently received information on the discovery and would report it the next day, ahead of the scheduled announcement. As Likely recalled,

> he went on to say that he didn't feel bound by our restrictions, as he had already obtained the data on his own. I begged, pleaded, and cajoled that he not break the story ahead of time. I reminded him that he would have an extra three days to fine-tune his article and could therefore write in greater depth. I convinced him. He agreed to wait. Then, late afternoon the day before the big

day, Harry Schmeck of the *Times* called to say that the *Times* syndicate in London had the J story on the wire. Jonathan Piel, then the public relations department's science writer, and I spent the next five or six hours calling AP, UPI, (putting the story on their wires) and every science writer we could reach to cancel the embargo and give them the data. I had the privilege of calling Earl. When I finished telling him, there was no verbal abuse, no screams, no curses. Just a great quiet, then a sigh, and a voice saying. "Leo Durocher said it all: 'Nice guys finish last.'" [39]

Ubell apparently did not regret being a nice guy. He later recalled the J-particle incident to an interviewer. "I think I wrote a better story that the *Times*," he said. "I believe that getting it first is not so important as getting it best. And this is the way I've built my career." [40]

Walter Sullivan of the *New York Times* recalled the incident somewhat differently. Physicist Victor Weisskopf telephoned Sullivan before Sullivan ever heard of the discovery of the J particle. Without revealing the discovery, Weisskopf asked Sullivan to delay publishing any news of it until it was published in *Physical Review Letters*. Shortly afterward, a source tipped Sullivan to the details of the discovery. Using a telephone in the press box at Yale's football stadium -- where he was watching the Yale-Princeton football game -- he got physicists at Stanford to describe the discovery. By halftime, George Trigg, one of the editors of the physics journal, authorized Sullivan to write the story, which appeared on the front page.[41]

The widespread dependence by science writers on prepackaged information such as that provided through journal embargoes was noted in the first major study of science journalism, by Hillier Krieghbaum in 1967. He wrote that "While some top-flight science reporters do go out foraging in laboratories and on campuses for news, most spend their time attending science and technical conventions, reading journals, and scanning press releases. More than in most other fields, such as politics, say, the news comes to the science writers." [42]

In one respect, the 1960s drew to an end as it began, with a journal editor asserting control over interactions between scientists and journalists over research that had not yet been peer reviewed. In 1969, Franz Ingelfinger, editor of the *New England Journal of Medicine*, became upset when a scientist submitted a paper to his journal that already had been described in detail by a medical trade newspaper covering a medical conference. Ingelfinger declared that he would refuse to publish any paper "if the speaker makes illustrations available to the interviewer, or if the published interview covers practically all the principal points contained in a subsequently submitted manuscript." [43]

This stricture has since been emulated by many scholarly journals and has become known among scientists, journalists and journal editors as the Ingelfinger rule --in an unfortunate lack of recognition of Goudsmit's own similar approach. Unlike Goudsmit's proclamation, Ingelfinger's was met with immediate, vocal criticism from journalists, largely because they feared that it would hamper journalists in their coverage of medical research conferences, for example by making researchers reticent to clarify or extend their conference remarks to journalists. The editor of the NASW's newsletter declared that the Ingelfinger rule "amounts to censorship," in part because much medical research is publicly funded and therefore should be open to public scrutiny.[44] Other NASW members raised a din in letters to the editor. The journalists' dispute with Ingelfinger would continue through the 1970s[45] and persist with his successors, Arnold Relman in the 1970s and 1980s[46] and Marcia Angell and Jerome Kassirer in the 1990s.[47]

Widening Leaks: The 1970s and 1980s

But as medical journals moved to expand their control over interactions between journalists and scientists, Goudsmit's journal relinquished that power. When James A. Krumhansl took over editorship of *Physical Review Letters* in 1975, he reiterated Goudsmit's policy against pre-publication publicity in an editorial. "We again conclude that our profession and the public are not responsibly served when news releases preempt the critical viewing by the physics community."[48] This declaration drew protests from several senior physicists -- but apparently none from journalists. For example, Edwin Goldhasser of the Fermilab particle physics center wrote to the society's president to complain that Goudsmit's rule hampered news coverage of scientific discoveries. "Why, I continue to wonder, do we continue to deprive ourselves of the healthy interest and participation of press and public at times of excitement in our field?"[49]

From retirement, Goudsmit weighed in against any change. He submitted to the society's governing board a letter endorsing the Goudsmit rule from Walter Sullivan, science editor of the *New York Times*. Sullivan argued that journalists are not qualified to assess the validity of scientific research and so should wait to report on research until it has passed through peer review. He concluded that "it seems to me that there is no question ... [that] the physics community is best served by your present restraints."[50]

Nonetheless, the governing council voted to void the Goudsmit rule, stressing "its dedication to the rapid and accurate dissemination of information to both the scientific community and the public. Accordingly, reports of new developments in the public news media will not be considered as prior publication prejudicial to acceptance of articles." [51] Krumhansl then published another editorial in *Physical Review Letters* in which he offered rapid publication to exceptional research by omitting the usual peer review, so long as a senior scientist unconnected with the research endorsed the request for expedited publication. "We hope that the pressure for anticipatory mass-media publicity will thereby be reduced." [52]

Journalists' increasingly uneven adherence to embargoes and scientists' increasing propensity to announce results to the public rather than to peers led Edward Edelson of the *New*

York Daily News to declare in late 1980 that the "old principle of scientific communication is collapsing." Although the embargo system supposedly ensures that scientific accounts of research are not preempted by popular ones, "the net result is that most scientists hear about a finding in the newspapers or on television." He suggested that the embargo system be replaced with a "free-for-all....We have that system now in every other field; it is called the free exchange of ideas." [53]

At about this time, science journalists also found themselves in the unaccustomed position of being the subject of research themselves, when communication researcher Sharon Dunwoody published studies[54] documenting cooperative behaviors by science journalists covering the AAAS annual meeting in 1977 in Denver. Her research did not address embargoes, but it did cite other cooperative behaviors such as supportive questioning at news conferences and sharing of expertise among reporters. These findings apparently caused discomfiture among some science journalists. After Dunwoody's research was published, unidentified science journalists told her that their news gathering practices at conferences differed from their news gathering behaviors at other times.[55] This suggests that the journalists did not draw the obvious parallels between Dunwoody's findings and their heavy, routine reliance on embargoed materials.

At the same time, there was increasing concern that individuals other than journalists might obtain access to embargoed information for their own financial benefit. In 1981, stock in the pharmaceutical firm Merck & Co. rose by more than $4 a share after the *New England Journal of Medicine* provided journalists with embargoed copies of a study showing promising results for a Merck heart attack drug. Wall Street analysts had access to the embargoed information either by being on the journal's mailing list themselves or through contacts with journalists. Jerry Bishop of the *Wall Street Journal* concluded that "this is an intolerable situation for it undermines the concept of a release time. Should it continue, science writers may be forced to begin ignoring release times on journals altogether." [56] In response, in 1982, the *New England Journal of Medicine* started limiting the mailings of embargoed materials to journalists who would promise in writing that they would adhere to the release time. [57]

Even when enterprising reporters gathered research news independently, they could run afoul of the embargo system. In 1986, the *Journal of the American Medical Association* dropped the *Miami Herald* from embargoed access after accusing the newspaper of prematurely reporting an AIDS study. The reporter claimed that he had researched the AIDS story without relying on embargoed materials; free of the embargo, he independently reported several other studies from the journal in advance of the embargo release time. [58]

A particularly troublesome area was embargoes on information that had commercial value. Perhaps the best publicized embargo failure occurred in January 1988, when the Reuter news service broke the *New England Journal of Medicine's* embargo by carrying a story about research in the use of aspirin to prevent heart attacks, two days before the embargo time. The wire story triggered an immediate spate of stories from competing wire stories, newspapers and television. In punishment, the editor of the journal, Arnold Relman, suspended Reuter's embargoed access to the journal for six months --even though the news service's executive editor claimed that Reuter learned about the study independently. [59]

The incident appears to have triggered some introspection among participants in the embargo system. In its aftermath, for example, the editor of *Nature* acknowledged that the embargo system gives journals "the benefit that their contents are likely to be noticed in writing by more periodicals than would otherwise have done so." [60] Meanwhile, Daniel Greenberg, a veteran science journalist, concluded that the embargo system reveals that science journalists as a group are lazy. "If the press wants speedy access to new research findings, it could pursue scientific information with the same vigour that it goes after, say, a political scandal. But if it wants to be spoon fed, it should abide by the rules of the feeders." [61]

New Technology in the midst of Mounting Controversy: The 1990s

A 1994 embargo violation aptly illustrated the pressures that journalists bring on their peers to conform to the embargo system. It happened when ABC News broke the embargo on a *New England Journal of Medicine* study that concluded that dietary supplements failed to reduce the incidence of cancer. The ensuing controversy erupted into news stories in the *New York Times* and *Washington Post*. "This isn't journalism," the Post quoted NBC science correspondent Robert Bazell as saying in criticism of ABC. "It's like pretending you're getting a scoop. It's stupid and cheap." [62]

In response, ABC medical editor Dr. Timothy Johnson wrote an open letter to other journalists, stating that he broke the embargo because he was afraid that other media were also going to break it. The National Cancer Institute had held a press conference to discuss the study, and Johnson said he believed other journalists would use the press conference as a pretext for reporting on the study -- even though other journalists said that the press conference clearly was considered embargoed as well. But the criticism from his peers clearly had stung, because Johnson's open letter then proceeded to forswear any further embargo violations:

> I personally will never break the embargo again -- unless others clearly do so first -- even when I am very worried that a story will leak before the embargo time. I would also urge medical scientists and researchers not to hold public press conferences until embargo day to help insure the keeping of the embargo. As I have done for twenty years, I will keep my word to anyone or any institution about holding sensitive information until the proper time. [63]

After making this defense, the *New England Journal of Medicine* announced it would not discipline ABC News "because we were assured by those involved at ABC News that they regretted their decision and would not violate the embargo again."[64]

Scientific research of potential commercial value is not limited to medical journals, and neither are embargo violations of such studies. Stock prices of the biotechnology firm Amgen surged in 1995 when a stock analyst was able to deduce from journalists' inquiries that the company was about to publish a study in *Science* describing a hormone with potential ability to help patients lose weight. "Undeterred by press embargoes, investment analysts say they will jump at the chance to pass along advance information that will benefit investors," a news article in the journal concluded.[65]

Companies also have found ways to gain access to embargoed information and turn it to their benefit. For example, in 1996, the *New England Journal of Medicine* published a study that concluded that the anti-obesity drug Redux would cause cancer in some people. The journal also published an editorial that concluded that the drug would save more lives than the cancer deaths it would cause. American Home Products Corp., which markets the drug, got an advance copy of the editorial from a journalist who had received it under embargo. Before the embargo lifted, the company issued a press release touting the journal's positive editorial, in an effort to draw attention from the negative conclusion of the study. The stock of the drug's manufacturer rose from the publicity.[66]

Another incident just a few months later showed how completely in thrall many science journalists were to the embargo notices. In late November, *Science* issued its routine weekly embargoed press release describing articles in its November 29 issue. As usual, the release described some papers in great detail and listed only the titles of others. One of those that was described only by title was a paper reporting the possible discovery of ice on the moon. There was no news coverage of the paper until the Defense Department -- which had sponsored the research -- called a news conference on December 3, long after journalists ordinarily would have considered studies from the November 29 issue to have gone stale.[67]

But such incidents did little to weaken the embargo system's grip. For example, Boyce Rensberger of the *Washington Post* strongly praised embargoes in a science-writing manual published in 1997 under the sponsorship of the National Association of Science Writers. The embargo system, he wrote, "is a very good thing because science stories are more complex than ever and it takes time, sometimes several days, to do a good job. The embargo system removes the temptation to beat the competition, giving us more time to do our jobs well and giving the readers better-written stories."[68]

One exception to the uncritical acceptance of embargoes was the *New York Times'* medical reporter, Lawrence K. Altman, who blasted the Ingelfinger rule and the embargo system in a two-part essay published in 1996 in *The Lancet*, a British medical journal that itself provides embargoed copies to journalists. Altman, himself a physician, concluded that there is little evidence that the Ingelfinger rule improves the quality of scientific journals and therefore should be dropped.[69] Altman's argument led *The Lancet's* editor to write that he was inclined to rescind its version of the Ingelfinger rule. "Perhaps the question boils down simply to this: can editors trust investigators to report their research responsibly, and if not, why not?"[70]

Nevertheless, embargoes have continued to expand in the 1990s, due largely to the wide availability of computerized communications. Even before the Internet became popular, the

National Association of Science Writers began operating a section of the CompuServe computer service that was restricted to NASW members. Embargoed information from *Science, Nature* and other journals was posted regularly on this service. Larry Krumenaker, the NASW official who ran the service stated that anyone who misused embargoed information from the service would be denied future access to the system.[71] This effectively placed the National Association of Science Writers in the position of enforcing the journals' embargo rules.

The growing popularity of the Internet computer network in the mid 1990s provided a new route for dissemination of embargoed information. A commercial venture called Quadnet, started in the early 1990s, sent press releases from universities and companies to science reporters by electronic mail. Journalists participating in the system were warned that they would be dropped from the service if they violated embargoes on the electronic press releases.[72] In 1996, the American Association for the Advancement of Science started offering a site on the World Wide Web, called Eurekalert, which journalists could use to obtain embargoed information from its journal as well as from other journals and universities that participated in the service.

However, the Internet also provides new routes for reporters to make end runs around the embargo system. For example, in 1995, a reporter from the *Chronicle of Higher Education* used an Internet newsgroup devoted to particle physics to gather information on the discovery of a new subatomic particle, called the top quark, days before the news was formally announced. A graduate student who had attended a seminar on the discovery posted details on the newsgroup -- which the reporter read and used as the basis of telephone interviews. The reporter had all the information he needed days before the *New York Times* and *Chicago Tribune* broke the story; because of his publication's weekly schedule, he was unable to break the story first.[73]

Journal editors have tried to prevent such incidents by construing the Ingelfinger rule to forbid pre-publication dissemination of scientific findings via the Internet.[74] Although scientists have decried this tactic[75], journalists have been silent on the issue, perhaps because few yet use the Internet for newsgathering enough to understand the implications. Alternatively, the journalists may be satisfied with the current embargo arrangement and have little intention to use the Internet to subvert it.

Conclusions

Today, journalists often describe themselves as being captives of the embargo system. For example, Natalie Angier of the *New York Times* claims that the embargo system gives journal editors "a stranglehold on journalistic initiative."[76] In the view of these journalists, editors of journals wield enormous power over what information journalists can have access to and when. However, the historical account presented in this paper suggests a different interpretation. The embargo system was created at the demand -- at times quite vociferous -- of journalists themselves. Journal editors, scientific societies and scientists had to be cajoled into participating in the system. The complaints from journalists that the present-day system holds them captive also can be seen as disingenuous. Most violations of the embargo system by journalists have arisen from premature disclosure of embargoed materials themselves rather than from the fruits of independent reporting entirely divorced from the embargo system. This suggests that journalists enjoy the embargo system, perhaps because it both provides a steady stream of news of a reliable character and reduces the risk that a given journalist will be "scooped" by competitors, since all are part of the embargo system.

Since the early days of science journalism, journalists have bitterly complained about public relations efforts, but they rarely have conceptualized the embargo system as a public relations tactic, even though embargoes are common in press releases. Given the extensive reliance of journalists on embargoed journal articles, perhaps this denial of the public relations aspect of embargoes was necessary for journalists to reconcile themselves to their reliance upon a system with heavy public-relations overtones.

The advent of cyberspace could expand the embargo system or kill it entirely. The prospects for expansion include, as noted earlier, the increasing ease with which journals can provide embargoed materials to journalists through the Internet. But this very widening also could weaken the social control by journalists over one another that has been the key to the enforcement of the embargo system. Early science journalists knew that they would have to face each other over and over again at scientific conferences and other news events; thus, if a journalist was contemplating violating an embargo, that journalist knew that he or she would encounter angry colleagues. But with the globalization of the Internet, more and more journalists from other countries are being admitted to the embargo system, and few of them may ever meet face to face. The social bonds that undergirded the embargo system soon may no longer exist, a development that could lead to more frequent embargo violations and eventually the collapse of the entire system.

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Perceptions of Newspaper Bias in a Local Environmental Controversy

by

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ABSTRACT

This study examines how perceptions of bias in local newspaper coverage relates to communication and participation in an unwanted landfill siting. Residents living within a one-mile radius of the proposed site received mailed questionnaires measuring attitudes, perceptions of bias in local newspaper coverage, communication behaviors, and policy-influencing activities concerning the proposed landfill. Analysis of responses (n=267) suggests perceptions of bias were unrelated to residents' newspaper reading behaviors and only slightly related to participation in the controversy.

INTRODUCTION

While mass media are frequently cited as sources for risk information (e.g., Ostman and Parker, 1986/1987; McCallum et al., 1991), their roles in local environmental conflicts can vary considerably. Research on local media suggests that sometimes media can "trigger" or precipitate a conflict, help to define a conflict, help to legitimate a conflict, or bestow status on certain positions within that conflict (Tichenor et al., 1980, pp. 113-114). Other times, their roles may be negligible.

For instance, what if local media are perceived as biased? Would it affect citizens' use of the media as sources of risk information or impact citizens' activities in relation to the controversy? Some research suggests that citizens do not expect local media to be unbiased, and perceptions of bias do not lessen citizen satisfaction with the media (Burgoon et al., 1981). Yet given our nation's traditional view that U.S. media serve as the "watchdog" the public, if citizens believe the local media are biased against the public's interests, wouldn't we expect some dissatisfaction with or at least a little less reliance on local media as sources of information?

This study investigates the role of local newspaper coverage in a community faced with hosting an unwanted land use, a new county landfill. We were interested in how perceptions of bias in local newspaper coverage related to citizens' communication behaviors and policy-influencing activities in the environmental controversy. In particular, if citizens perceive local newspaper coverage as biased, are they more or less likely to depend on the newspaper for information about the landfill; furthermore, are they more or less likely to participate in the conflict? A field survey of residents living adjacent to the proposed site offers some answers to these questions.

PREVIOUS RESEARCH

Because of their visibility, media and the stories they tell are often perceived as having great influence over public attitudes. Consequently, they are often held responsible for the possible effects these stories have on their audiences. For issues involving environmental risk and policy making, in particular, researchers have pointed to media coverage as a possible factor in the amplification of social concern about risk (Kasperson et al., 1988). Some content analyses of media coverage of environmental risk lend support to this argument, as researchers have found that when covering risk, media sometimes mention harms more than benefits (Singer and Endreny, 1993) and are driven by dramatic considerations (Greenberg et al., 1989 Barton, 1988).

Some argue, however, that increased media coverage, regardless of the content, amplifies public concern about risk. In particular, Mazur (1981; 1990) proposes a "quantity of coverage theory," arguing that the greater the volume of media coverage about a risk, the greater the assessment of risk by the public—independent of whether the media content is balanced, positive, or negative. He continues:

> In the case of a local project, such as a waste-disposal site, extensive reporting increases fear in the adjacent community and generally leads to opposition against the facility, even if the treatment of the news is balanced (1990, p. 295).

Mazur argues that presenting a "balanced" story suggests all sides are equally credible and that even mentioning negative outcomes evokes more concern than no mention at all (1990, p. 311). He attributes the "alarmism" effect to the inattentive manner in which most people consume news, e.g., glancing at photos or scanning headlines, which are parts of the article that tend to be exaggerated to interest audiences. Mazur supported his argument by comparing media coverage of nuclear power during the 1980s to public opinion about nuclear power; he found that when coverage was greatest, opinions were most negative.

Mazur, however, makes little or no mention about other factors contributing to the increase or decrease in public concern about risk. As Dunwoody and Peters (1992, p. 218) point out, "social environments are rich places, and it is becoming increasingly clear that the mass media are but a subset of many channels available to individuals." Mass media may serve to alert public attention to an environmental risk, but once aware of the risk, people often use other channels of communication, such as interpersonal networks.

For instance, studies examining the influence of mass media on judgments about risk have found that people sometimes rely on media to assess whether society is at risk; however, they usually rely on personal experiences to determine personal risk. Tyler and Cook (1984) examined this notion as the "impersonal impact hypothesis," which posits that media coverage generates societal level, not personal level, judgments of risk. From their analysis of survey data, the authors conclude that mass communications may not be as effective at generating behavior change as other communications (a finding also suggested by Robertson [1976] in his study of seat belt campaigns) and that the more removed people perceive themselves from a risk, the less likely they are to take actions to avoid that risk. Park et al. (1996) found support for the impersonal impact hypothesis when investigating survey responses for factors influencing risk judgments about water contaminants, radon, AIDS, and heart disease. Their analysis showed interpersonal communication primarily drove personal concern about risk, while mass communication drove societal concern. Citizens scoring high on community involvement were, however, less likely to exhibit this discrepancy in concern.

Culbertson and Stempel (1985) identified a similar effect, termed "media malaise," wherein people use media to evaluate society's well being, but not their own. Examining how media coverage of health care influenced public attitudes toward health care, the authors found that when people thought media coverage of health care was negative, they also tended to view health care negatively. These tendencies were strongest when people rated health care at the societal rather than the personal level. The authors conclude that personal experiences were more important when audiences were judging for themselves than when they were judging for society.

Proximity to the risk also mitigates the influence of media coverage on personal assessments of risk. Wiegman et al. (1991) compared attitudes of residents living adjacent to a chemical plant to residents living 15 miles away from the plant regarding the potential risk of contamination. The authors hypothesized that residents living next to the plant would use direct experiences in a "verification process" to filter media information and downplay information contradicting their own experiences. Conversely, people living farther from the plant would depend more on media coverage. Should that coverage be alarming, they would perceive the risks greater than those living close to the plant would perceive them.

The authors analyzed media coverage about the plant and found it was generally negative. In addition, they found that people living adjacent to the plant were: (1) more negative about the media coverage, (2) less likely to use media for information, (3) more likely to rely on informal channels of communication, and (4) generally less concerned about the risks from the plant. In comparison, people living further from the plant were more concerned about the risks and said they relied more on mass media than interpersonal channels for risk information.

The authors discuss their findings in relation to Bandura's (1969, 1977, 1986) social learning theory, which holds that the more media dominate a person's life, the more people will learn vicariously from the media and less from direct experiences. In this sense, people living farther from the plant must rely on media for information about the plant and would take their cues from media stories, a sort of media-constructed reality.

Another explanation comes from research on "optimistic biases" (Weinstein, 1980; 1989; Weinstein & Lachendro, 1982), or those tendencies people have to see themselves less likely to experience a risk than others. In the case of the chemical plant, people living near the chemical plant may have downplayed the probability of risk. For instance, research has found that when people choose or are forced to "live with" a risk, due to economical, social, cultural, or political reasons, they may ignore a risk or prefer not to acknowledge its probability of occurrence (e.g., Lave and Lave [1991] on how people rationalize living in flood plains). Studies suggest, however, that direct exposure to a risk may alter attitudes and even create pessimistic biases (Dolinski et al., 1987), though this pessimism may be short-lived following a decrease in media coverage (e.g., Burger and Palmer [1992] on the aftermath of a California earthquake on residents' attitudes).

How trustworthy or credible people view an risk information source can also impact its influence on attitudes. For example, McCallum et al. (1991) found that while local media were survey respondents' most frequently cited sources of environmental risk information, media only scored mid-range on a trust index. In comparison, friends, relatives, and physicians were infrequent sources of risk information, but they tended to score very high on trust. Ostman and Parker (1986/1987) also found that although citizens must frequently cited newspapers and television as sources for environmental information, they though other sources, such as books or magazines, were more credible. In general, the authors found that respondents were quite critical of media coverage of environmental issues, with 58 percent agreeing that media were likely to adapt stories to fit their own political leanings, and 81 percent agreeing that media were likely to sensationalize human interest aspects of the story.

To summarize, while some have argued that the quantity of media coverage of risk influences public assessments of risk (e.g., more coverage about risk promotes more public concern about risk), other research suggests that media's impact may be differential or short-lived. Additionally, personal or direct experiences with the risk may amplify or mitigate the influence of media messages on personal risk judgments, as may opinions about the credibility of media coverage. Although mass media serve as frequent sources of environmental risk information, people tend to trust information from interpersonal sources more. Other research in communication suggests that interpersonal sources often carry more weight than mass-mediated ones in securing attitudinal or behavioral change (see, for example, research building on Katz and Lazarsfeld [1955] and Rogers [1995] on the role of interpersonal influence).

What has not been examined is how perceptions of media bias relate to attitudes and behaviors about environmental risk. Particularly, if local media are perceived as "teaming up" with the "opponent's" viewpoint, does that impact citizens' reliance on the newspaper for information about the conflict or their participation in the conflict? The following study endeavors to answer these questions.

Current Study

Building upon the above theoretical framework, this study examines the role of local newspaper coverage in an environmental conflict. The controversy erupted when an upstate New York county government proposed siting a new county landfill in one of its communities. Community residents opposed; a drawn-out and emotional debate ensued. Using field survey of residents' attitudes and behaviors, this study examines how perceptions of bias in local newspaper coverage related to residents' communication behaviors and participation in the environmental controversy.

The survey was commissioned on behalf of the community's Citizen's Advisory Committee (CAC) as a participation tool for identifying residents' concerns and opinions toward a variety of host-community benefit possibilities. A series of communication-related questions (not of particular interest to the CAC) were included in the questionnaire for subsequent and secondary analyses. The data from these questions allowed, with some limitations, to construct the conceptual framework for testable hypotheses.

Research Questions, Hypotheses, and Rationale

The first research question examines the relationship between citizens' attitudes toward newspaper coverage and their use of newspapers for information about the landfill. Did opinions about newspaper bias relate to citizens' use of the newspaper? Previous research identified a relationship between attitudes toward media coverage and use of media for risk information: people who thought newspaper articles lacked credibility were less likely to read them (Wiegman et al., 1991). However, earlier research suggested that audiences expected bias in local media and were therefore not overly negative about it (Burgoon et al., 1981). Thus, we were interested in investigating whether a relationship existed between perceptions of bias and newspaper readership, and if so, to identify the nature of that relationship.

The second research question examines the relationship between citizens' attitudes toward newspaper coverage and their participation in the controversy. Did perceptions of bias in newspaper coverage relate to their activities? For example, would people who believed newspaper coverage favored the county's position (i.e., wanting to site the landfill) be prompted to take action and protest, or would they perceive participation as somewhat of a "lost cause" and therefore not worth the effort?

Moving away momentarily from questions regarding perceptions of bias, this study's hypotheses focus on the relationship between communication behaviors and concern about the landfill. The first tests Mazur's (1981) quantity of coverage hypothesis, which contends that the more media coverage that an individual is exposed to, irrespective of the coverage's content, the more negative that individual will be about the risks. We hypothesized: (H1) People who reported reading more newspaper articles would also be more concerned about the landfill.

As noted earlier, we believe Mazur's hypothesis may oversimplify the relationship between media coverage and concern and ignore that media are among multiple information sources, among them interpersonal contacts. In particular, the number of times individuals talk with others about the landfill could also relate to how concerned they are about the landfill. Therefore, we also hypothesized: (H2) People who talked more with others about the landfill would also be more concerned about the landfill.

Finally, we wanted to examine how the number of newspaper articles respondents reported reading related to their participation in the controversy. That is, were citizens who read more articles also more likely to participate in the controversy? Studies suggest media coverage of risk influences concern primarily at the *societal* as opposed to the *personal* level (Tyler and Cook, 1984; Culbertson and Stempel, 1985); therefore, reading more articles may not make people feel personally more at risk. If people do not see themselves personally at risk, they may not act to reduce exposure to that risk, like becoming involved in the decision-making process. Thus, we hypothesized: (H3): The quantity of newspaper articles that citizens read about the landfill would not relate to their likelihood of participation in the controversy.

METHODS

Surveys

Questionnaires were mailed to all residents (n=368) living within one mile of the proposed county landfill site. This parameter was requested by the CAC to ensure that key stakeholders or residents directly impacted by the landfill decision were included in the sample. The questionnaire consisted of 48 questions, measuring approximately 140 variables. Questions in the survey addressed residents' concerns, their attitudes toward the proposed landfill, their attitudes toward landfills in general, their preferences among a range of host mitigation and compensation measures, and their activities related to the siting process. A total of 267 completed questionnaires were returned, yielding a 75 percent adjusted response rate.[1] Responses were entered into SPSS for analysis.

Analysis

To measure perceptions of bias in the newspaper coverage of the proposed landfill, the questionnaire asked a series of questions about the coverage: "Newspaper articles I have read favor my position on the landfill," "Newspaper articles are generally fair—unbiased in discussing the landfill," and "Newspaper articles favor the county position." Responses were scaled from 1 to 5 ("strongly disagree" to "strongly agree").

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[1] The 3-wave mailing included individually addressed and personally signed letters to each resident household. Of the 368 questionnaires, 13 were returned unanswered due to bad addresses or ineligible respondents (e.g., deceased), 3 were refused, and 267 were completed. The overall response rate of 72.6% was adjusted for the bad addresses and ineligible respondents yielding a response rate of 75.3%.

To gauge their exposure to local newspaper articles, respondents were asked whether they had read any articles concerning the landfill in the local newspaper during the past year and, if so, to estimate the number of articles.

To measure participation, citizens were asked a series of questions, such as whether they had written or called local media, talked to local or county officials, or attended any public meetings about the landfill. We focused on three behaviors: writing letters to the newspaper, talking to elected county officials, and participating in public meetings. Participation in public meetings was measured as "did not attend," "attended but did not speak," to "attended and spoke out." For all three factors, higher scores signified higher levels of participation.

To measure concern, the survey also asked respondents how "bad" they expected a list of possible negative effects of the landfill to be, from "very bad" to "somewhat bad" to "not bad" to "not sure." These included traffic effects (e.g., noise and litter), landfill site effects (e.g., litter, smells, animal pests, etc.), and other possibilities (e.g., pollution of private wells, changes in property values, pollution of county reservoir, bad images of this part of town, etc.). In total, survey responses to 15 questions were summed to provide a measure of respondents' perceptions of "bad effects" from the landfill (alpha=.92), where higher scores signified more concern.

Interpersonal communication was measured by asking respondents how many times they had talked with their spouse or members of the household, with neighbors, or with coworkers about the landfill in the past year. Choices were "not at all," "once or twice," "3 to 5 times," "6 to 9 times," or "10 or more times." These questions were added to form a measure of interpersonal talking behavior (alpha=.82).

RESULTS

Research Questions

Table I shows the range of responses to the questions about perceptions of bias in the newspaper coverage of the proposed landfill siting. Generally, there is a fairly uniform distribution in opinions about the newspaper coverage. Although 51 percent agreed that the newspaper was unbiased in its coverage of the landfill siting, 41 percent disagreed that coverage was unbiased. Regarding the direction of the bias, 45 percent of respondents agreed with the statement that the coverage favored the county position on the landfill, whereas 36 percent disagreed. Finally, 40 percent agreed with the statement that the coverage favored their own position, and 44 percent disagreed.[2]

To investigate whether the 40 percent who believed coverage favored their own position also thought coverage favored the county position (i.e., their personal position agreed with that of the county), we constructed two variables, each representing those who agreed or strongly agreed with the above two statements. The variables were negatively correlated (r=-.26, p=.000), suggesting that if respondents believed coverage favored their own positions, they were unlikely to believe coverage favored county positions, and vice versa.

Table II shows the bivariate correlations between variables, also illustrated in Figure 1. The results suggest some interesting biases, and not only on behalf of the newspapers. People who responded that the newspaper coverage favored their personal positions about the proposed county landfill were significantly more likely to also agree that the coverage was both adequate and

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[2] Was newspaper coverage of the landfill biased? Preliminary results of a content analysis of local newspaper articles appearing one year prior to the survey suggest that coverage was generally objective: 46 percent of the statements reported were neutral, 34 percent were critical of the county's position, and 21 percent were supportive of the county's position.

*un*biased (r=.25 and .47, p<.01). In comparison, those agreeing with the statement that the coverage favored county positions were significantly more likely to judge the coverage both *in*adequate and biased (r=-.33 and -.52, p<.01). Thus, it appears that respondents were less critical of newspaper coverage when they perceived coverage as favoring their personal positions. Logically, if they replied that coverage favored their personal positions, they should have also responded that the coverage was biased—even if it was biased in *their favor*.

The first research question explored the relationship between perceptions of bias in newspaper coverage and use of the newspaper for information about the landfill. Almost all of our respondents (99 percent) reported reading some newspaper articles about the landfill in the past year, with the average number of articles being 41. Furthermore, the results suggest that those who perceived coverage favored their personal positions were significantly more likely to read newspaper articles (r=.14, p<.05). Perceiving that coverage favored county positions or perceiving coverage was unbiased was unrelated to the quantity of newspaper articles that respondents reported reading.

The second research question concerned the relationship between perceptions of bias in newspaper coverage and citizen participation in the conflict. The results suggest perceptions of bias were unrelated to writing letters to the newspaper or participating in public meetings. Those who believed newspaper articles favored their personal positions were, however, significantly more likely to talk with elected county officials (r=.13, p<.05).

Hypotheses

The first two hypotheses tested the relationship between communication behaviors and concern about negative effects from the landfill. The first hypothesis stated that citizens who reported reading more newspaper articles would be more concerned about the landfill. The results support the hypothesis (r=.19, p<.01): the quantity of articles read increased with concern about the landfill. The second hypothesis predicted that citizens who reported talking more with family, neighbors, and coworkers about the landfill would be more concerned about the landfill. This hypothesis was also supported (r=.31, p<.01). In sum, people who were more concerned about the landfill also tended to read more newspaper articles and talk more with others about the landfill.

To determine which factor had the stronger relation to concern about the landfill, we ran the first test again, only this time we controlled for talking behavior. The significance between quantity of articles and concern about the landfill disappeared. When we ran the second test and controlled for number of articles, the significance between quantity of talking and concern about the landfill remained (r=.32, p,.01). This finding suggests that talking about the landfill has a stronger relationship with concern than reading newspaper articles.

The third hypothesis stated that the quantity of newspaper articles citizens reported reading about the landfill would not increase with increased participation in the conflict. The results do not support this hypothesis. Citizens who reported reading more newspaper articles were significantly more likely to talk with elected county officials (r=.36, p<.01), write letters to the local newspaper (r=.31, p<.01), and participate in public meetings (r=.36, p<.01).

DISCUSSION

Perceptions of bias in the newspaper coverage were fairly polarized, with about one-half believing that the coverage supported county positions and one-half thinking the coverage supported their own positions. Interestingly, when respondents thought newspaper coverage favored county positions, they thought the coverage was biased and inadequate. On the other hand, if they thought coverage favored their own positions, coverage was unbiased and adequate. Evidently, respondents' own biases were at work here.

We might have expected that citizens who believed coverage favored county positions would have written letters to the newspaper to voice their dissatisfaction or make sure their side was heard; yet, the results suggest otherwise. Perceptions of bias in newspaper coverage were unrelated to writing letters to the newspaper or participating in the public meetings. Several explanations come to mind. First, attending meetings or writing letters to the local newspaper requires time and motivation that citizens responding to our survey may not have had. Second, should some respondents have been motivated to attend meetings or write letters to the newspaper, one deterrent could be that they feared an attempt to present another viewpoint would be "attacked" in the public forum or editorial page. Third, respondents may simply be negative about the decision-making process and believe nothing positive would come of their involvement.

Interestingly, those who thought coverage favored their personal positions (yet, according to them, were still "unbiased") were more likely to have talked with elected county officials. Perhaps perceiving their own position as advocated in the newspaper gave our respondents added confidence of local support and made them more willing to talk with those involved in the decision-making process.

Concern about the landfill was related to the number of newspaper articles respondents read. Those who reported reading more articles were more concerned about the possible risks of hosting a landfill. Concern about the landfill was also related to talking with family, friends, and coworkers about the landfill. The use of partial controls on the analysis suggests, however, that conversations with others offers a better gauge of overall concern in this study than quantity of newspaper articles. Thus, while the findings lend support to Mazur's quantity of coverage hypothesis, the support is tempered by the demonstration of interpersonal communication's relation to concern about risk.

The strong relationship between the number of articles read and the number of times respondents talked with county elected officials, wrote letters to the newspaper, and participated in public meetings was unexpected, given that previous studies have shown mass media are often ineffective at generating action at the individual level. One explanation for this discrepancy may be that the earlier studies measured personal vs. societal on a much larger scale (i.e., U.S.-wide) than our study, which looked at personal vs. societal in one community. Although studies have examined local media impact on community involvement (e.g., Stamm et al., 1997), few have examined media and community involvement within a risk-based context. One that did found that local community involvement seems to mitigates the differential impact of risk perceptions (Park et al., 1996). Additional studies are needed to examine local media's impact on risk perceptions at the community levels.

CONCLUSIONS

This study offers one example of the role of local newspaper coverage in a local controversy. The findings are at the micro- rather than macro-level; generalizations should therefore be applied cautiously. Though communities often share the very common experience of facing a locally unwanted land-use, the role of newspapers is likely to vary considerably. In addition, the nature of cross-sectional data precludes making "cause and effect" assumptions. Therefore, we hesitate to state, for example, whether concern about the landfill preceded reading about it in the newspaper, or vice versa.

Still, it seems clear that residents in this community used the local newspaper as a source of information about the landfill—whether to confirm information received via interpersonal channels or gather information for conversations with others. Moreover, it seems that perceiving newspaper coverage as biased did not decrease their reliance on newspapers for information about the landfill.

Why would residents continue to read articles they perceived as biased or favoring county positions? One possibility is that their information-gathering behaviors were routine, and perceptions of bias were insufficient to prompt them to seek out new information channels (not to mention that they may have still considered the newspaper useful for other sorts of information). People may perceive a source as biased, and interpret it as such, but they are unlikely to change traditional consumption behaviors over a few incidents. Few would argue that it is easy to change behaviors. Similarly, perceptions of bias in the newspaper may not motivate people to cancel a subscription or seek out new sources of information, i.e., to change their media consumption behaviors. As some have suggested, people may even expect local media to be biased (Burgoon et al., 1981).

Perceptions of bias in newspaper coverage were also not directly related to concern about the landfill. Indirectly, however, a relationship exists. Those who thought coverage favored their own positions were more likely to read newspaper articles, and those who read more newspaper articles, tended to be more concerned about the negative effects of the landfill. Again, our data do not demonstrate cause and effect; therefore, the order of these relationships remains unclear. It seems, however, that reading articles tended to reinforce these citizens' concerns about the landfill, as opposed to alleviating them.

Finally, perceptions of bias were unrelated to whether citizens chose to become involved in the controversy, with the exception of those who thought coverage favored their own positions. Believing coverage was aligned with county interests or was just plain "biased" did not appear to motivate citizens to become involved in the decision-making process.

Table I. Description of Responses to Questions on Bias in Newspaper Coverage[a]

		Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Articles favor county	Count	25	65	41	67	33
	%	6.8%	29.4%	18.6%	30.3%	14.9%
Articles are unbiased	Count	28	63	17	102	11
	%	12.7%	28.5%	7.7%	46.2%	5.0%
Articles favor my position	Count	32	64	35	68	19
	%	14.7%	29.4%	16.1%	31.2%	8.7%

[a]Responses range from 1=Strongly Disagree to 5=Strongly Agree.

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Table II. Pearson Correlations[a]

Variables	Articles are unbiased	Articles favor my position	Coverage is adequate	Number of articles read	Expect bad effects from landfill	Times talked with family, etc.	Times talked with officials	Letters written to local paper	Participate in public meetings
Articles favor county	**-.524****	**-.495****	**-.327****	-.041	.061	-.013	-.115	-.034	-.119
Articles are unbiased		**.474****	**.329****	.071	-.004	.000	.038	-.113	.091
Articles favor me			**.252****	**.143***	.075	.008	**.130***	-.004	.106
Coverage is adequate				**.160***	-.065	**-.137***	.025	-.065	.024
Number of articles read					**.188***	**.312****	**.355****	**.311****	**.359****
Expect bad effects						**.349****	**.236****	**.185***	**.200****
Talked with family, etc.							**.318****	**.183****	**.374****
Talked with officials								**.481****	**.428****
Letters to local paper									**.365****

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

[a] Listwise N=192

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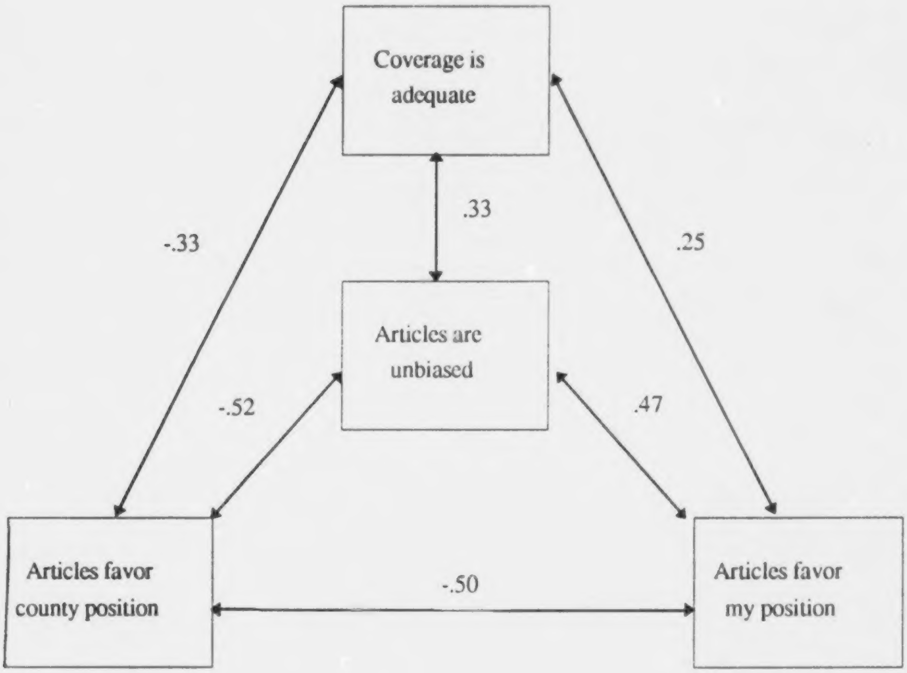
Figure 1. Diagram showing relationships between variables[a]


Coverage is adequate
.33
-.33
.25
Articles are unbiased
-.52
.47
Articles favor county position
-.50
Articles favor my position

[a] Pearson correlations between variables are all significant at the 0.01 level.

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NEWSPAPER ECONOMIC COVERAGE OF MOTOR VEHICLE EMISSIONS STANDARDS

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Newspaper Economic Coverage

of Motor Vehicle Emissions Standards

Abstract

This study analyzed six large newspaper's economic coverage of federal regulations intended to reduce motor vehicle emissions under the Clean Air Act. Examination of this topic involved evaluating costs and benefits of government controls.

All but one paper explicitly referred to formal cost-benefit analysis as a method to evaluate the standards. They all included specific economic costs and benefits associated with regulating motor vehicle emissions. However, the reporting on costs was far more extensive than on benefits in five of the papers.

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Newspaper Economic Coverage of Motor Vehicle Emissions Standards

Society is in the midst of an era of environmental awareness. Opinion polls show the public is sensitive to the state of the environment. An important element of this awareness is the role of the press in shaping public opinion about environmental problems.

However, an overwhelming number of environmental stories center on highly visible events or crises. This leads some observers to argue that newspapers are not fulfilling their public policy role because they are neglecting stories that investigate the complexities of environmental issues and that explain long-term environmental consequences.[1] Certainly, policy decisions by government and citizens require an informed analysis of environmental concerns that cast scientific scrutiny and set priorities in the context of economic objectives.[2]

This study analyzed newspaper economic coverage of federal regulations intended to reduce motor vehicle emissions under the Clean Air Act. Examination of this topic involved evaluating costs and benefits of government controls. Such economic analysis is valuable in assessing policies that affect the environment and for estimating environmental damages resulting from human action, such as air pollution.

Cost-Benefit Analysis

The involvement of the federal government in major environmental decisions is not new, nor is the application of economic principles and methods to such decisions. Economists generally contend environmental regulations should be subjected to cost-benefit analysis to make certain that the expected benefits of the protective measures justify the costs.[3] Cost-benefit analysis is a formal procedure for evaluating the positive and negative economic consequences of a policy.

The major difficulty is that cost-benefit analysis is forward looking and requires an estimate of what a particular government regulation will cost. This is much more burdensome than tracking down what an existing regulation does cost. In addition, cost-benefit analysis must try to quantify variables that normally are not quantified, such as quality of life from reduced air pollution.

Although a challenge to implement, cost-benefit analysis can establish the least expensive ways to accomplish predetermined policy goals. For instance, as part of its mandate to enforce the Clean Air Act, the Environmental Protection Agency nearly 20 years ago analyzed the projected costs of implementing air quality standards by various regulatory approaches.[4]

It is argued such an assessment was not adequately made of the Clean Air Act amendments passed by Congress in 1990. The amendments will cost $10 billion to $20 billion more than originally budgeted. An expense that even the head of an environmental organization which supported the amended legislation admitted "may exceed

67

benefits by a considerable margin."[5] In 1995, the House of Representatives declared that the act's regulations would have to adhere to new cost-benefit criteria.[6]

Today in newsrooms across the country, the hot story is the cost of environmental regulation. Some journalists report that regulations are an unnecessary drain on the nation's productivity, and newspaper editorial writers lament the money "wasted" on enforcement.[7] It will be determined whether the trend of emphasizing regulatory costs applies to the reporting on methods intended to reduce motor vehicle emissions.

Case Studies

Cost-benefit analysis is accepted by regulators as a tool in determining environmental policy. Citizens are less likely to use this formal approach in evaluating government policy. However, they often informally evaluate the positive and negative impact of regulations in forming opinions and voting. This informal evaluation usually includes consideration of the economic costs and benefits of a given policy, if sufficient economic information is obtainable. Little is known about the availability in the news media of economic material concerning environmental policy. Only a few case studies have been published about such economic content.

In one study, a local newspaper's reporting on a proposed hazardous waste facility in its community provided some economic information. The coverage consisted of sources supporting the waste facility specifying benefits, while opposing sources listed the costs. In essence, the stories were written in a them versus us manner. Lacking context, the economic information was insufficient for an informed analysis of the desirability of the project.[8]

A controversy involving the Endangered Species Act analyzed in *The Knoxville News-Sentinel* and *The* New York *Times* contained many important economic issues. But it is not clear whether the public obtained enough information to view the struggle as anything more than a dispute over a three-inch "insignificant" fish that was blocking a 90-percent complete dam.[9]

These two case studies indicate that environmental news stories often contain scant economic content. However, some evidence points to increased prevalence of economic issues in the environmental coverage of *The New York Times* and *The Washington Post*. Less emphasis in the two papers on degradation and protection of the environment and more attention to economic ramifications may reflect the recent movement toward environmental deregulation and economic development.[10]

Clean Air Act

The Clean Air Act of 1968 was the first national legislation in the United States aimed at air pollution control. Its provisions included standards for automobile exhausts of carbon monoxide and hydrocarbons. One of the longest and potentially most far-reaching regulatory programs ever enacted, the law has been amended three times.[11]

The most recent amendments in 1990 mandated that cities meet defined air quality standards or be faced with reduced federal funds and other penalties. All cities were required to implement plans that will insure that air quality standards are met by 2005. Across the country cities have implemented a variety of measures to reduce motor vehicle emissions. Enormous sums of money have been spent and the air quality in many cities has improved considerably. Other cities are still behind in meeting standards.[12]

During the 1995 and 1996 legislative sessions, Congress passed four bills modifying provisions of the Clean Air Act as the Environmental Protection Agency and the states continued to implement requirements of the law's 1990 amendments. Numerous issues remain including decisions regarding low emission and zero emission motor vehicles. But actions have been taken on motor vehicle emissions regulations. States with employee commute-option programs can remove such requirements if they establish alternative methods to achieve equivalent motor vehicle emissions reductions. EPA was prevented from implementing stringent smog controls in California. The state has continued development of its own implementation plan which was approved last year by EPA.[13]

Research Questions

The press reports specific environmental incidents, such as the Exxon Valdez oil spill, but less clear is how it covers regulatory issues such as economic costs and benefits to society. To improve understanding of this coverage, this study explored large metropolitan dailies' economic coverage of the Clean Air Act's motor vehicle emissions standards.

Motor vehicle emissions controls provide an unique opportunity for study for two reasons. First, they are a federally mandated policy that must be carried out locally. Air quality greatly depends on how motor vehicle emissions are dealt with on a metropolitan basis even though the standards are set at the national level. By studying metropolitan areas, rather than the entire country, newspapers from these areas can be compared and contrasted for variations in coverage. These variations can be correlated with other variables, such as type of reporter and actual air quality, in an effort to explore relationships between content and its antecedents.

Second, the Environmental Protection Agency has developed national standards of air quality and collects data about costs and benefits of regulating motor vehicle emissions. Because journalists have access to these government-generated data, the Clean Air Act offers a good opportunity to examine how the press covers the economics of environmental regulation.

The following research questions were posed:

1. How extensively did six metropolitan daily newspapers report specific economic figures about the costs and benefits of federal regulations enacted to decrease motor vehicle emissions under the Clean Air Act?

2. What percentage of stories specifically referred to cost-benefit analysis of motor vehicle emissions regulations?

3. What percentage of stories specifically referred to the economic costs of motor vehicle emissions regulations?

4. What percentage of stories specifically referred to the economic benefits of motor vehicle emissions regulations?

5. Did the number of words specifically referring to economic costs and benefits of motor vehicle emissions regulations vary by newspaper, type of reporter and topic?

6. Was there a correlation between the number of words specifically referring to economic costs and benefits of motor vehicle emissions regulations and air quality in the six newspapers' cities?

Method

This study examined how six large dailies reported the economic costs and benefits of government regulations established to reduce motor vehicle emissions under the Clean Air Act. Three newspapers distributed nationally -- *Los Angeles Times, The New York Times*, and *The Washington Post* -- and three leading regional papers -- *Atlanta Constitution*, *Chicago Tribune*, and *The Dallas Morning News* -- were selected. The daily circulation of the papers ranged from 300,000 for the *Atlanta* Constitution to 1.1 million for the *Los Angeles Times*.[14]

The nationally recognized newspapers were analyzed because they are considered papers of record, the ones policy makers read to identify national trends. The three other papers were included because they represent large regional dailies that millions of Americans read every day. These papers have the resources to do their own reporting on environmental issues.

Also, the six newspapers represent metropolitan areas throughout the country with some of the worst air pollution problems. The six areas experienced unhealthy levels of air quality in 1995 as defined by the Environmental Protection Agency Pollutant Standards Index.[15]

All news stories, features, and news analyses contained in the six dailies during 1995 that discussed the economics of motor vehicle emissions regulations under the Clean Air Act were coded. These articles were located and down loaded from the Nexus data base. Reference was to highway-operable motor vehicles, not lawn mowers and motorboats. Items appearing on the editorial or op/ed page were not analyzed. Similarly, short fillers and digests and stories about air pollution unrelated to motor vehicle emissions were excluded.

The units of analysis were the entire story and number of words. Coders were instructed to identify costs and benefits within every applicable newspaper story. Costs and benefits needed to be explicitly stated and directly related to motor vehicle emissions controls under the Clean Air Act.

Economic costs were defined as an added expense. They included such items as local and state governments' expenses for implementing federal regulations, businesses' expenses for complying with the regulations, and consumers' expenses from paying higher prices for cars and fuels. Economic benefits were defined as a financial gain. They included the expectations that local and state governments would increase the size of their bureaucracies, businesses would develop new products and markets, and consumers would acquire new jobs and reduce their health care costs.

Intercoder reliability was measured using Pearson's product moment correlation for interval-level data and Scott's pi for nominal-level data. A random selection of 75 stories, taken from the 281 stories examined in this study, was based on the formula for choosing probability samples for reliability checks.[16] Two coders coded each story for the reliability check. The Pearson's r extended from .945 to .999, and the Scott's pi ranged from .87 to .96.[17] The reliability was judged to be acceptable for all variables.

Results

The six newspapers ran 281 stories during 1995 that contained economic coverage of Clean Air Act standards devised to lower motor vehicle emissions. Average story length was 711 words, with a standard deviation of 439 words. The longest story consisted of 2,559 words and the shortest 26 words.

Newspaper staff writers wrote 69% of the stories, and 14% were from wire services. Seven stories combined staff and wire reports, and 15% were not identified as either staff or wire.

Table 1 breaks down the number and average length of stories by newspaper. The *Los Angeles Times* published the most stories with economic content related to regulations on motor vehicle emissions. Its 73 stories were 30% more than *The Dallas Morning News*, the paper with the next most number of stories. The 30 stories reported in *The Washington Post* were the fewest.

The New York Times ran the longest stories -- an average of 916 words. The shortest stories appeared in the *Atlanta*

Constitution. Their average length of 459 words was about half the length of the *Times'* stories.

INSERT TABLE 1 ABOUT HERE

Variations in story length were largely similar for the six newspapers. The coefficient of variation (CV) in Table 1 is the standard deviation divided by the mean. The higher the value, the more variation in story lengths. The coefficients of variation for all the papers except *The Dallas Morning News* were between .56 and .65. These statistics indicate that the papers ran some longer stories and some shorter stories, but most tended to be close to the average length. The CV of .45 for the *News* indicates slightly less variation than for the others.

The first research question asked how extensively did the six newspapers report specific economic figures about the costs and benefits of federal regulations enacted to decrease motor vehicle emissions under the Clean Air Act? Table 2 shows that 88 of the 281 stories (31.3%) included specific figures about costs related to motor vehicle emissions controls. Fifty-one stories (18.1%) presented specific figures about its benefits. The stories reporting costs averaged 3 specific numbers compared with 1.9 specific numbers for those reporting benefits. *The Dallas Morning News* had the most stories with specific costs and benefits figures, and the *Chicago Tribune* had the fewest.

INSERT TABLE 2 ABOUT HERE

Research question two asked what percentage of stories specifically referred to cost-benefit analysis of motor vehicle emissions regulations? Table 2 shows that 34 of the 281 stories (12.1 percent) mentioned this technique for evaluating the impact of motor vehicle emissions controls. The *Los Angeles Times'* reference to cost-benefit analysis in 11 stories was the most frequent. *The Dallas Morning News* was next with mentions of it in 10 stories. Cost-benefit analysis was not referred to in the *Chicago Tribune*, and *The Washington Post* mentioned it only once.

Research question three asked what percentage of stories specifically referred to the economic costs of motor vehicle emissions regulations? Table 3 reveals that 167 of the 281 stories (59%) reported on these costs. The discussion of costs averaged 82 words per story or 11.4% of the total number of words.

Table 3 also shows coverage of how economic costs of motor vehicle emissions controls affected consumers, business and government. Of the 167 stories that included these costs, the 110 that addressed expenses to consumers averaged 36 words (4.7%). The 94 stories that contained costs to businesses averaged essentially the same number of words as applied to consumers. The 50 stories that reported costs to government averaged only 9.6 words (1.4%).

INSERT TABLE 3 ABOUT HERE

Research question four asked what percentage of stories specifically referred to the economic benefits of motor vehicle emissions regulations? Table 3 shows that 115 of the 281 stories (41%) presented these benefits. References to benefits averaged 39 words per story, which was 6% of the total number of words.

Table 3 also illustrates how the economic benefits of motor vehicle emissions controls affected consumers, business and government. Of the 167 stories that reported these benefits, the 69 that included financial gains to consumers averaged 15.5 words (2.7%). The 62 stories that discussed benefits to businesses averaged 18.8 words (2.5%). Only 16 stories referred to benefits to government with an average of a minuscule 3.7 words (0.9%).

In the consumer, business and government categories in Table 3, economic information about costs exceeds that about benefits. In fact, the average number of words devoted to costs is nearly double those given to benefits.

Research question five asks if the number of words specifically mentioning economic costs and economic benefits of motor vehicle emissions regulations vary by newspaper, type of writer and topic? Tables 4 through 6 address this question.

Table 4 breaks down the stories according to newspaper. The six newspapers provided more stories and averaged more words that referred to economic costs than to economic benefits of motor vehicle emissions controls. *The New York Times* published the longest stories on the topic, but its coverage was the most one sided. The paper ran more than twice as many stories that contained costs as stories that contained benefits (29 to 12) and averaged a staggering 245% more words about costs than about benefits. The *Los Angeles Times*, *The Washington Post*, *Chicago Tribune*, and *The Dallas Morning News* published at least twice as many words that concerned costs as benefits. Only the *Atlanta Constitution* approached balanced treatment with 22 stories that included economic costs and 20 stories that included economic benefits. These stories averaged 48.4 words about economic costs and 40.9 words about economic benefits.

INSERT TABLE 4 ABOUT HERE

Table 5 presents the stories by type of reporter. General assignment reporters wrote a little more than half (147) of the 281 stories. Ninety-three stories were written by specialty reporters assigned to environmental, science, business or automotive beats. The reporters for the remaining 41 stories could not be classified.

INSERT TABLE 5 ABOUT HERE

Overall, specialty reporters provided more balanced coverage than did general assignment reporters. The two types of reporters wrote an equivalent number of words about the economic costs of motor vehicle emissions standards. Specialty reporters averaged 91 words and 3 specific figures per story compared with 90 words and 3.2 specific figures per story by general assignment reporters. However, specialty and general assignment reporters differed in their coverage of the economic benefits of motor vehicle emissions controls. Specialty reporters averaged 51.5 words and 2.9 specific figures per story compared with 35.4 words and 1.4 specific figure per story by general assignment reporters.

Table 6 breaks down the 281 stories by topic. Formulating motor vehicle emissions regulations received the most coverage with 82 stories (29%), followed by 63 stories (22%) about alternatives to the combustion engine. The next most often reported topics were:

emissions testing, 46 stories (16%); air pollution, 35 stories, 12%; gasoline and diesel fuel, 20 stories, 7%; and carpooling, 13 stories, 5%.

Each type of story averaged two to three times more words about economic costs than economic benefits, except for stories about alternatives to the combustion engine. The 33 stories that contained costs of alternatives to the combustion engine averaged 45.7 words compared with an average of 45.4 words for the 32 stories that mentioned benefits of the alternatives.

INSERT TABLE 6 ABOUT HERE

Research question 6 asked was there a correlation between the number of words specifically referring to economic costs and economic benefits of motor vehicle emissions regulations and air quality in the six newspapers' cities? Table 7 shows the total number of words each newspaper published about motor vehicle emissions controls and the Environmental Protection Agency's ranking of the cities by days of poor air quality.[18]

The Spearman's rho for the two categories is .37, which is a low correlation. However, the rho is somewhat misleading because of the *Atlanta Constitution's* limited coverage. Atlanta ranked second for poor air quality but lowest in coverage about motor vehicle emissions restrictions. If the Atlanta paper were dropped from the table, the Spearman's rho for the other five metropolitan areas would be .9, which is quite high. Of course, if the study had included more newspapers, the impact of Atlanta's disparity between amount of news coverage and number of air pollution days would have been reduced.

INSERT TABLE 7 ABOUT HERE

Conclusions

How well did the six metropolitan dailies report the economic costs and benefits of federal regulations to control motor vehicle emissions? It is difficult to evaluate quantitative measures of journalistic performance because no generally accepted quantified standards exist. However, the data collected do yield some insight into news coverage of the economics related to a complex environmental issue.

Overall, the six newspapers provided specific information during 1995 about the economic impact of motor vehicle emissions controls. All but one paper explicitly referred to formal cost-benefit analysis as a method to evaluate the regulations. They all contained specific economic costs and benefits associated with regulating motor vehicle emissions.

Including these economic data in news stories indicate that these newspapers moved beyond event-oriented reporting that often characterizes environmental stories.[19] Eighty-two stories contained information about the costs or benefits of formulating motor vehicle emissions regulations, and 63 had information about the costs or benefits of alternatives to the internal combustion engine, which is a primary source of air pollution. Coverage of alternatives to the internal combustion engine had the most balanced coverage with nearly an equal number of stories and number of words about the costs and benefits.

The most extensive coverage involved the impact of the regulations on consumers, followed by the impact on businesses. Of the 281 stories, 110 provided information about costs to consumers and 69 provided information about benefits to consumers. Ninety-four stories concerned costs and 62 concerned benefits to businesses. However, coverage of both areas was imbalanced, with consumer coverage being slightly more imbalanced than business coverage.

Some critics argue that the role of the press is to provide a picture of reality.[20] This study found that air quality was correlated with news coverage in five of the six cities. With the exception of Atlanta, there was a relationship between the quality of air and the amount of reporting on the economic impact of the Clean Air Act. As air quality declined the amount of coverage increased. The implication is that in five of the cities air quality was helping to drive news coverage of the environment.

Nonetheless, the reporting of economic issues was not balanced. In most cases, the costs were emphasized far more than the benefits. This finding supports the contention that journalists consider the costs of environmental controls to be highly newsworthy in an era of deregulation.[21] However, the emphasis on costs was not consistent among journalists. General assignment reporters provided less balance than specialty reporters who covered environmental, scientific, business and automotive issues.

This finding implies that expertise accumulated on a beat results in more balanced coverage.

The newspapers also showed some variation in emphasis on costs. The only paper that came close to providing balanced coverage of motor vehicle emissions standards was the *Atlanta Constitution*. Its average difference between costs and benefits was only eight words per story. On the other hand, *The New York Times* devoted almost three times as many words to costs as to benefits. The four other newspapers tended to be closer to the imbalance of the *Times* than to the balance of the *Constitution*.

The conclusions of this study have limited generalizability. Only one year and six newspapers were examined. This research also is limited in that it identified relationships between content and other variables but did not control for other variables. Such control would require a much larger sample of newspapers.

Because of its limited generalizability, the study should be replicated using other environmental issues and regulations. For example, has coverage of farmland run off included specific economic costs and benefits? Additional studies should look at the connection between a reporter's beat and balanced coverage. Do reporters assigned to other beats provide more balanced stories than general assignment reporters who write about the beat? Also of interest here is the nature of the imbalance and its causes. Is the imbalance consistent with these newspapers' coverage of other beats? What other factors besides type of reporter explain such imbalance?

Despite these limitations, this study provides increased understanding of environmental news coverage. The focus is valuable because economic costs and benefits are important elements in formulating regulations. The results indicate that the six large dailies reported specific, complex economic information. However, this reporting was balanced between costs and benefits in only one newspaper, and that paper did not provide as much coverage of motor vehicle emissions controls as the city's air quality would seem to warrant. How imbalanced coverage affects public opinion and policy is beyond the scope of this study and appears to be a next logical step in the study of media and the environment.

Notes

1. Emilia Askari, "Readers Thirst for More About Their Environment," *The American Editor* (October 1995): 14; Sharon M. Friedman, "Two Decades of the Environmental Beat," in "Covering the Environment," *Gannett Center Journal* 4 (summer 1990): 13-24; Jim Detjen, "The Traditionalist's Tools (And a Fistful of New Ones)," in "Covering the Environment," *Gannett Center Journal* 4 (summer 1990): 73-83.

2. Amal Kumar Naj, "Greens and Greenbacks," in "Covering the Environment," *Gannett Center Journal* 4 (summer 1990): 89-90.

3. V. Kerry Smith, ed., *Environmental Policy under Reagan's Executive Order: The Role of Benefit-Cost Analysis* (Chapel Hill, NC: The University of North Carolina Press, 1984), 44, 58.

4. Robert J. Anderson Jr., Robert O. Reid, and Eugene P. Seskin, *An Analysis of Alternative Policies for Attaining and Maintaining a Short-Term NO_2 Standard* (Princeton, NJ: Mathtech, 1979), 18.

5. Warren T. Brookes, "Sense and Nonsense on the Environment," *The Quill* 79 (January/February 1991): 14-15.

6. John H. Cushman Jr., "Republicans Clear Cut Regulatory Timberland," *The New York Times*, 5 March 1995, sec. D, p. 16, col. 4.

7. Kevin Carmody, "It's a Jungle Out There," *Columbia Journalism Review* 34 (May/June 1995): 40-45.

8. Karen S. Johnson-Cartee, Bryan A. Graham and Deborah Foster, "Siting a Hazardous Waste Incinerator: Newspaper Risk Communication and Public Opinion Analysis," *Newspaper Research Journal* 13 & 14 (fall 1992/winter 1993): 64, 70.

9. Carroll J. Glynn and Albert R. Tims, "Sensationalism in Science Issues: A Case Study," *Journalism Quarterly* 59 (spring 1982): 131.

10. Erick Howenstine, "Environmental Reporting: Shift from 1970 to 1982," *Journalism Quarterly* 64 (winter 1987): 842-846.

11. Ruth A. Eblen and William R. Eblen, eds., *Encyclopedia of the Environment* (Boston: Houghton Mifflin Company, 1994), 95.

12. Eblen and Eblen, *Encyclopedia of the Environment*.

13. "95034: Clean Air Act Issues," Congressional Research Service Issue Brief, Washington, D.C., December 2, 1996.

14. *1995 Editor & Publisher International Yearbook*.

15. *1995 National Air Quality and Emissions Trends Report* (U.S. Environmental Protection Agency, December 20, 1996) http://www.epa.gov/oar/aqtrnd95/report/

16. Stephen Lacy and Daniel Riffe, "Sampling Error and Selecting Intercoder Reliability Samples for Nominal Content Categories," *Journalism and Mass Communication Quarterly* 73 (winter 1996): 963-973.

17. The Pearson's correlation coefficients for the interval-level data and their confidence intervals were: *number of specific cost figures in a story*, r = .999 and the confidence interval = .993 to 1.0 at the 95% level of probability; *number of specific benefit figures in a story*, r = .945 and the confidence interval = .864 to .978 at the 95% level of probability; *number of words in a story about costs*, r = .98 and the confidence interval = .967 to .988 at the 95% percent level of probability; and *number of words in a story about benefits*, r = .995 and the confidence interval = .990 to .998 at the 95% level of probability.

The Scott's pi figures for the nominal-level data and their confidence intervals were: presence of *specific cost-benefit analysis*, pi = .87 and the confidence interval = .822 to .918 at the 95% level of probability; *type of reporter*, pi = .988 and the confidence interval = .978 to .998 at the 95% level of probability; *topics of cost*, pi = .96 and the confidence interval = .940 to .980 at the 95% level of probability; and *topics of benefits*, pi = .96 and the confidence interval = .950 to .970 at the 95% level of probability.

18. *National Air Quality and Emissions Trends Report, 1995.*

19. Askari, "Readers Thirst for More About Their Environment"; Friedman, "Two Decades of the Environmental Beat"; Detjen, "The Traditionalist's Tools."

20. Commission on Freedom of the Press. *A Free and Responsible Press* (Chicago: University of Chicago Press, 1947).

21. Carmody, "It's a Jungle Out There."

Table 1

Average Words Per Story and Standard Deviations of Stories by Newspaper

Newspaper	Number of Stories	Average Words Per Story	Standard Deviation	Coefficient of Variation
Los Angeles Times	73	746	488	.65
Dallas Morning News	56	710	324	.45
Atlanta Constitution	43	459	277	.60
New York Times	40	916	510	.56
Chicago Tribune	39	587	344	.59
Washington Post	30	882	495	.56
Total	281	711	439	.62

Table 2

Use of Specific Economic Data and Cost-Benefit Analysis by Newspaper

Newspaper	Average Times Specific Cost Figure Used in a Story*	Average Times Specific Benefit Figure Used in a Story*	Percent of Stories with Specific Mention of Cost-Benefit Analysis
Chicago Tribune	4.1 (7)	1.7 (6)	0.0% (0)
Dallas Morning News	3.5 (26)	1.4 (17)	17.9% (10)
New York Times	3.1 (17)	3.7 (3)	12.5% (5)
Los Angeles Times	2.6 (18)	3.0 (10)	15.1% (11)
Atlanta Constitution	2.4 (7)	1.2 (10)	16.3% (7)
Washington Post	2.3 (13)	2.0 (5)	3.3% (1)
Total	3.0 (88)	1.9 (51)	12.1% (34)

* The averages are only for stories that include specific economic data. The numbers of such stories are in parentheses.

Table 3

Average Number of Words and Percentage of Words Describing Costs and Benefits*

Group	Costs		Benefits		Difference	
	Words	Percent	Words	Percent	Words	Percent
Consumers	35.8	4.7%	15.5	2.7%	20.3	2.0%
	(110)		(69)		(41)	
Business	34.9	4.4%	18.8	2.5%	16.1	1.9%
	(94)		(62)		(32)	
Government	9.6	1.4%	3.7	0.9%	5.9	0.5%
	(50)		(16)		(34)	
Unspecified	1.2	0.8%	0.9	0.3%	0.3	0.5%
	(6)		(6)		(0)	
All groups	81.7	11.4%	39.1	6.4%	42.6	5.0%
	(167)		(115)		(52)	

* The average represents all stories. Not all stories included costs and benefits. The numbers of stories that contained such information are in parentheses.

Table 4

Average Number of Words and Percentage of Words Describing Costs and Benefits by Newspaper*

Newspaper	Costs		Benefits	
	Words	Percent	Words	Percent
New York Times	113.5	11.8%	46.3	4.3%
(40)	(29)		(12)	
Dallas Morning News	98.1	12.3%	39.6	6.4%
(56)	(38)		(28)	
Los Angeles Times	78.0	9.0%	38.4	6.0%
(73)	(36)		(28)	
Washington Post	73.7	8.8%	35.0	5.0%
(30)	(20)		(10)	
Chicago Tribune	73.4	16.7%	32.4	8.5%
(39)	(22)		(17)	
Atlanta Constitution	48.4	10.7%	40.9	8.3%
(43)	(22)		(20)	

* The numbers of stories are in parentheses.

Table 5

Average Number of Words Describing Costs and Benefits and Average Number of Specific Figures by Reporters' Specialty*

	Words		Specific Figures	
	Costs	Benefits	Costs	Benefits
Specialty reporters** (93)	90.9	51.5	3.0	2.9
General assignment reporters (147)	89.7	35.4	3.2	1.4

* The numbers of stories are in parentheses.

** Specialty reporters covered environmental, science, business, or automotive news.

Table 6

Average Number of Words and Percentage of Words Describing Costs and Benefits by Primary Topic*

Type of Story	Costs		Benefits	
	Words	Percent	Words	Percent
Carpooling	163.1	6.9%	75.0	7.6%
(13)	(9)		(8)	
Gasoline/diesel	135.9	17.1%	70.4	14.4%
(20)	(12)		(12)	
Emissions testing	112.6	15.1%	40.9	7.8%
(46)	(35)		(22)	
Formulating regulations	101.6	12.6%	37.4	4.6%
(82)	(59)		(33)	
Alternatives to combustion engines	45.7	8.1%	45.4	9.3%
(63)	(33)		(32)	
General air pollution	26.6	8.7%	5.2	0.1%
(35)	(10)		(2)	

* The numbers of stories are in parentheses. Stories related to "other" topics were left out of the table.

Table 7

Total Coverage and Ranking of Community by Poor Quality of Air

Newspaper	Total Words about Motor Vehicle Emissions Controls	Days of Poor Air Quality*
Los Angeles Times	54,450	84
Dallas Morning News	39,760	13
New York Times	36,640	7
Washington Post	26,460	8
Chicago Tribune	22, 893	4
Atlanta Constitution	19,737	19

* "National Air Quality and Admissions Trends Report," 1995, EPA, December 1996. Days each metropolitan area had air pollution levels in the unhealthful range.

Connecting Theory and Practice: Are Counterstereotypes Effective in Changing Girls' Perceptions of Science and Scientists?

by

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Abstract

Connecting Theory and Practice: Are Counterstereotypes Effective in Changing Girls' Perceptions of Science and Scientists?

Researchers, educators, and policy makers have emphasized the need for science intervention programs to change girls' perceptions of science and scientists. A common technique used by many of these programs, including many media programs, is the use of counterstereotypes of women scientists. Little research, however, examines why the use of roles models would be effective or which characteristics of role models are most persuasive in changing perceptions of science.

This paper connects theory and practice by drawing on Bem's gender schema theory (Bem 1981, 1983) to develop a framework for examining the influence of women scientist role models on girls' perceptions of science and scientists. The purpose of this paper is 1) to describe the usefulness of Bem's gender schema theory as a framework for guiding future research, 2) to examine the fundamental premises of Bem's gender schema theory as they relate to the processing of information about science and gender roles, 3) to explore the potential influence of counterstereotypes in changing gender-stereotyped perceptions of science and 4) to identify some of the key criteria for effective counterstereotypical models for media intervention programs.

Connecting Theory and Practice: Are Counterstereotypes Effective in Changing Girls' Perceptions of Science and Scientists?

Introduction

Identifying strategies to promote greater interest in science and engineering among girls has been the focus of much research in recent years. Prompted by the recognition that future scientific and technological advancements will require drawing on the scientific knowledge and technical skills of all people, many intervention programs have been developed to increase the participation of girl in science. Clewell (1987) defines intervention programs as "educational programs that address a problem that is not being adequately addressed by the educational system" (p. 95). A recent national survey identified 109 science intervention programs for female middle school students (Clewell et al. 1992).

The need for science intervention programs for girls still exists today despite increases in the number of women receiving degrees in science and entering scientific professions in the past 30 years (Barber 1995). Statistics show that the number of women who participate in educational and professional opportunities in science still does not equal the number of men who participate. As Vetter (1996) explains, "the increase leveled off in most areas well before women achieved demographic parity or occupational equality with men" (p. 29).

According to recent statistics, 39 percent of all master's degrees and 31 percent of all doctoral degrees in the agricultural, biological, and physical sciences awarded in 1992-

93 in the United States were earned by women, and only 15 percent of all master's degrees and 10 percent of all doctoral degrees in engineering awarded in that year were earned by women. (National Center for Education Statistics 1995). Employment statistics show that only 27 percent of employed natural scientists and 8 percent of employed engineers in early 1996 in the United States were women. (U.S. Department of Labor 1996).

Researchers, educators, and policy makers have emphasized the importance of intervention efforts to change girls' perceptions of science. As Kremer (1984) writes, "Special efforts are needed in the form of educational intervention to alter attitudes and behaviors that have discouraged women in the past" (p. 51). Kremer (1984) explains that science intervention programs "can have lasting effects on the individual's cognitive and social capabilities, even on changing attitudes that are directly linked to pervasive cultural influences" (p. 68).

In recent years, science intervention programs have been offered in variety of formal educational settings (such as schools, labs, and universities) and informal educational settings (such as museums, on the Internet, and at home). Some of these programs include, for example, single-sex science classes (Peterson 1995; Wee 1995; Brosnan 1994), a "female-friendly" science lab (Balcom 1995), a telementoring project (Gardner 1995), a "Science-By-Mail" mentoring program for girls (Ross 1994), an all-girls science camp (Hillenmeyer 1995), and school-based science programs and workshops for girls (Lauer-

Williams 1995; Davis 1995; Brown 1995; Becker 1987).

Some other recent intervention efforts to foster girls' interest in science have involved the use of the mass media. For example, television programs like "Discovering Women" and "Breakthroughs: The Changing Face of Science," broadcast on PBS, and radio programs like "Science Lives: Women and Minorities in the Sciences," broadcast on KUOM Radio, have featured successful women scientists. In addition, educational science programs for middle school-aged children like "Newton's Apple" and "Bill Nye the Science Guy," also broadcast on PBS, regularly present segments that feature women scientists.

The use of counterstereotypes of women scientists, or women scientist role models, is a common technique used by many science intervention programs, including many media programs. The assumption behind the use of counterstereotypes of women scientists is that exposure to women scientist role models reduces girls' stereotyping of science that leads them to think that scientific careers are inappropriate for women. Few systematic efforts have been made, however, to assess the effectiveness of counterstereotypes in reducing stereotyping of science. As Oakes (1990) explains, few efforts have been made "to analyze the effectiveness of various program features or to assess the conditions under which particular interventions are effective" (p. 66). In addition, few intervention programs have been designed based on theories that can best inform program design. (See Clewell 1987, however, who argues that many program

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designs appear to be based unconsciously on assumptions grounded in theory). As Acker and Oatley (1993) explain, "Rarely asked, it seems, is what explicit or implicit theories lie behind innovation efforts" (p. 265).

This paper connects theory and practice by drawing on Bem's gender schema theory (Bem 1981, 1983) to develop a framework for examining the potential influence of counterstereotypes of women scientists on girls' perceptions of science and scientists. Given the recent proliferation of science intervention programs, the mass media are likely to continue to be important vehicles for future programs. However, more information is needed to explain why the use role models would be effective or which characteristics of role models are most persuasive in changing girls' perceptions of science. The purpose of this paper is 1) to describe the usefulness of Bem's gender schema theory as a framework for guiding future research, 2) to examine the fundamental premises of Bem's gender schema theory as they relate to the processing of information about science and gender roles, 3) to explore the potential influence of counterstereotypes in changing gender-stereotyped perceptions of science and 4) to identify some of the key criteria for effective counterstereotypical models for media intervention programs.

The section that follows below begins by describing Bem's gender schema theory.

Gender Schema Theory

Psychological theories of development offer explanations that describe how children learn about gender roles and how their perceptions of gender roles guide behavior. Although several theories of development could be used to explore how children develop knowledge about gender roles (See Steinke and Long 1996), the unique feature of gender schema theory is its emphasis on the dominant role of gender over other factors in the processing of information. Gender schema theory provides a comprehensive framework for understanding the central role that gender plays in defining and guiding gender-related behavior.

Gender schema theory describes how children learn cultural definitions of gender and gender roles. According to gender schema theory, in a gender-polarized society, children readily process and organize information about themselves according to cultural definitions of maleness and femaleness (Bem 1981, 1983, 1993). Children develop gender schemata, "cognitive structures that organize an individual's gender-related knowledge, beliefs, attitudes, and preferences" (Liben and Signorella 1993, 141). These schemata influence their perceptions of the world. Children process and organize new information in terms of gender because they recognize that the social context in which they live focuses on gender (Bem 1981, 1983). According to gender schema theory, "the culture's insistence on the functional importance of the social category is what transforms a passive network of associations into an active and readily available schema for interpreting reality" (Bem 1983, 608).

Gender schema theory contains two fundamental premises that are useful for considering the potential influence of counterstereotypes of women scientists on girls' perceptions of science and scientists. These assumptions are: 1) cultural definitions of gender embedded in discourse and social practices are internalized by a developing child, and 2) once predisposed to these cultural definitions of gender, children will identify with them (Bem 1993). The following section explores how these two premises relate to research children's processing of information about gender and science.

Processing of Information about Gender and Science

Cultural definitions of gender and science are prevalent in the discourse and social practices of society. Throughout socialization girls develop gender-biased perspectives of the science because they view the world through gender-biased lenses or what Bem calls the "lenses of gender" (Bem 1993). Girls tend to see cultural definitions of gender and science that perpetuate what Kelly (1985) calls the "masculine image of science." Three primary socializing agents contribute to this "masculine image of science": school, home, and the media.

At school a number of factors reinforce the "masculine image of science." Among these factors are the preferential treatment of boys in science classrooms (Wellesley College Center for Research on Women 1992; Kahle and Lakes 1983; Matyas 1985a and 1985b; Jones and Wheatley 1990; Morse and Handley 1985) curriculum, teaching approaches, and assignments that favor male intellectual styles (Skolnick et al. 1982; Shemesh 1990; Lock

1992); teachers with gender-biased perceptions of girls' scientific ability (Shepardson and Pizzini 1992); a lack of female role models in science classrooms (Smith and Erb 1986); and the underrepresentation of women in science textbooks (Bazler and Simonis 1991; Potter and Rosser 1992; Taylor 1979; Whiteley 1996).

At home other factors also contribute to the "masculine image of science." These factors include the lack of women scientist role models and the discussion of scientific careers at home (Baker and Leary 1995), the overprotective behavior of parents that prevents girls from participating in research opportunities (Campbell 1991), mothers' reinforcement of traditional feminine stereotypes when seeking new relationships following a separation (Smith 1992), parents' gender-role stereotyped perceptions of their children's abilities in science and math (Eccles et al. 1990; Eccles and Jacobs 1986).

The images and messages conveyed by the mass media also contribute to the "masculine image of science." While much less research has focused on these factors, studies have found that media reports attributing sex differences in mathematics to biological factors negatively influence mothers' confidence in their daughters' math abilities (Eccles and Jacobs 1986) and that girls are aware of and influenced by the gender-stereotyped images of science and scientists in the media (Baker and Leary 1995).

Repeated exposure to the "masculine image of science" can have negative effects on girls' interest and achievement in science. Researchers have found that girls start to lose interest in science between the ages of 9 and 14 (Hardin and Dede 1978; Skolnick, Langbort, and Day 1982) and turn away from science careers during their high school years (Bruer 1984). Smith (1992) found that female students lost the advantage to male students in science achievement between the seventh and ninth grades. Smith suggests that the increased salience of traditionally feminine stereotypes may slow or halt female students' science achievement.

Gender schema explains how these cultural definitions of science and gender are internalized by girls and can then influence girls' perceptions of science and scientists. Bem (1993) explains that the "gender lenses embedded in cultural discourse and social practice" (p. 139) are internalized by children. Studies in support of gender schema theory have shown children's "generalized readiness" to interpret information according to cultural definitions of gender (Bem 1981; Bem 1983; Liben and Signorella 1993). Other studies have emphasized the "cognitive primacy" of gender in guiding interpretations of gender-defined situations (Bem and Lenney 1993; Bem 1981; Bem 1983; Bigler and Liben 1992; Liben and Signorella 1980; Liben and Signorella 1993; Ruble and Stangor 1986; Signorella and Liben 1984; Cann 1984).

Girls are just as likely to internalize the cultural definitions of gender and science they see in school, at home and in the media as they are likely to internalize other cultural cues about gender. Research found that children interpreted information in terms of their existing gender schemas when they had strong preconceived perceptions of gender-appropriate and gender-inappropriate behaviors (Signorella and Liben 1980), accepted gender-appropriate attributes and rejected gender-inappropriate attributes (Bem 1981), remembered information that was compatible with existing gender schemas (Koblinsky et al. 1978; Liben and Signorella 1980; Signorella and Liben 1980; Signorella 1992), organized their processing of social information (Levy 1995) and of television content (Calvert and Huston 1987); and altered information that was incompatible with existing gender schemas (Ruble and Stangor 1986; Signorella and Liben 1980).

According to the second premise of Bem's gender schema theory, girls not only internalize cultural definitions of gender, but also identify with them. Consequently, girls' perceptions of science and scientists are likely to be based on the cultural definitions of gender and science they have learned in school, at home, and from the media. Several studies show that when asked, most girls said they think of scientists as male (Maoldomhnaigh and Hunt 1988; Chambers 1983; Mead and Metraux 1957). During in-depth interviews with girls in grades 2, 5, 8 and 11, Baker and Leary (1995) found that "stereotypes of scientists were prominent in their thinking" (Baker and Leary 1995, 19).

Gender schema theory describes how perceptions of gender roles and science can have a lasting effect on girls' interest and participation in science and scientific careers. Bem (1993) writes that "once these gender lenses have been internalized, they predispose the child, and later the adult, to construct an identity that is consistent with them" (p. 139). Research shows that children's awareness of gender-role stereotyping is a powerful force throughout their development (Gray-Schlegel and Gray-Schlegel 1995-96) and that children's experiences during development influence the choices they make later in life (Reid and Stephens 1985).

Research shows that gender-role stereotyping can influence children's selection of occupations. Studies indicate that girls' stereotyping of occupations first occurs during the preschool years (Thompson 1975; Connor and Serbin 1977; Gettys and Cann 1981; O'Keefe and Hyde 1983). Bigler (1995) found children in classroom groups where differences were made based on gender showed greater gender stereotyping of occupations. Many (1989) found that children consistently assigned family roles and few occupational roles to the female characters in their writings. In a study of children ranging in age from 2 1/2 to 8 years, Gettys and Cann (1981) noted gender-role stereotyping of occupations in every age group. Geis (1984) found that girls were more likely to downplay their career aspirations after viewing stereotypical images of women in traditionally female roles on television. Looft (1971) and Siegel (1973) found that when asked about their career aspirations, girls selected a smaller range of occupations and more gender-role stereotyped occupations than boys.

The following section examines the effectiveness of counterstereotypes in reducing gender-stereotyping of science.

Using Counterstereotypes to Reduce Gender-Stereotyping of Science

Research on how to reduce gender-stereotyping of science is essential when designing intervention programs, especially given the power and resilience of gender schemata. Despite the powerful influence of existing gender schemata, however, several studies have shown that direct educational intervention can reduce children's gender-role stereotyping. Bigler and Liben (1992 and 1990) found less gender-role stereotyping of occupations in children who were taught that gender is an irrelevant criterion to use for sorting people into occupational categories (Bigler and Liben 1990; Bigler and Liben 1992). In a related study, O'Bryant and Corder-Bolz (1978) found girls rated traditionally male-dominated occupations more favorably when they saw televised female models holding these occupations. More recently, research by Griffin and his colleagues (1994) found that girls from low socioeconomic backgrounds chose less traditional occupations after exposure to television portrayals of female characters in non-traditional occupational roles.

Exposure to counterstereotypes, or positive role models, of women scientists may be an important first step in breaking down the prevailing barriers that contribute to the gender gap in science participation. Counterstereotypes of women scientists have been a critical component of several science intervention programs (Evans et al. 1995; Hubert and Burton 1995; Humphreys 1982). Evaluative research of these programs have found counterstereotypes to be effective in changing attitudes toward science and scientists. For example, an intervention program reported that seventy-three percent of participants in science career conferences said that contact with role models was the most important part of the program (Humphreys 1982). Similarly, another program that featured role models found that exposure to same-sex role models improved ninth-grade girls' attitudes toward science and scientific careers (Evans et al. 1995).

An in-school intervention project found that female role models were effective in changing the attitudes of ninth-grade male and female student students toward science, math and technical careers (Evans et al. 1995). The findings indicated that the intervention was most effective in changing female students' attitudes, which tended to be less positive at the beginning, than the male students' attitudes. The researchers explained, however, that the female role models also reinforced more positive attitudes among boys (Evans et al. 1995, 203).

A science intervention program for teachers showed that 12-year-old students' drawings of scientists were less stereotypical for students whose teachers had participated in an intervention program on gender equity in science than the drawings of students' whose teachers did not participate in the intervention program (Huber and Burton 1995). The researchers noted a slight change in girls' perceptions, but an even greater change in boys' perceptions, which were more stereotypic at the beginning of the project than were the girls'.

An outreach project in Canada found that 9- to 12-year old girls' images of scientists were less stereotypical after participating in the project that involved either all female role model groups or male and female role models groups working together on scientific activities (Schmidt and Nixon 1996). The researchers found a decline in the older girls' use of masculine descriptions of scientists. In fact, they reported that fewer than 15 percent of those surveyed volunteered a masculine image of scientists. They explained that because the groups were either all-female or mixed male and female groups, the girls "witnessed young women confidently doing science and interacting equally with male colleagues" (p. 260).

The Use of Counterstereotypes of Women Scientists

The Cross University Research in Engineering and Science (CURIES) group emphasized the need for systematic evaluation of science intervention programs (Hollenshead et al. 1996). The evaluations for the programs described in the previous section suggest that counterstereotypical images of women scientists can reduce girls' gender-stereotyping of science. Few of these evaluations examined the key conditions and criteria for the use of counterstereotypes of women scientists. Many questions about the effectiveness of counterstereotypes of women scientists remain unanswered. What conditions lead to positive changes in girls' perceptions of science and scientists? What kind of interaction with women scientist role models is needed to change girls' perceptions? What characteristics of women scientist role models are most effective in leading to positive changes in perceptions? This section relates research on counterstereotypes of women scientists to gender schema theory in order to outline some the key conditions and criteria for evaluating intervention programs that feature counterstereotypes of women scientists.

1. An increase in the Number and Frequency of Counterstereotypes

Girls experience years of exposure to masculine images of science and scientists from a variety of socializing forces, including the media. Studies of media content have documented the underrepresentation of women scientists in many media programs. (LaFollette 1981, LaFollette 1988; Fursich and Lester 1996; Steinke and Long 1996). In some cases, twice as many male scientists as female scientists have been found (Steinke and Long 1996). By showing fewer women scientists, the media send a clear message about the role of women in science.

The number and frequency of counterstereotypes is an important variable to examine in evaluations of science intervention programs. Direct educational interventions that include more counterstereotypes of women scientists may be important for changing existing gender schemata that contain stereotypical perceptions of women scientists. Frequent exposure to counterstereotypes may be most effective since existing gender schemata have been in place for many years and can be resilient to new and contradictory information.

2. Early Exposure to Counterstereotypes

Several researchers have emphasized the importance of early intervention in implementing science programs for girls (Humphreys 1982, Cronkite and Perl 1982; McCormick and Wolf 1993). Currently, many existing programs target girls during adolescence, a time when girls' perceptions of gender roles are firmly in place. For example, Clewell et al. (1992) found that the majority of the programs targeted students in or above six grade, and only one-third served students in the fourth or fifth grades. McCormick and Wolf (1993) also noted: "The majority of current interventions target secondary and post-secondary age females. By this time, attitudes and self-concept are largely shaped" (p. 87).

The age of intervention is another variable that needs to be examined in evaluations of science intervention programs. Early intervention may be important in light of the research that shows that behavior modification is more effective with preschool and grade-school children than older children (Katz 1986). Early intervention also may be more effective than interventions during the pre-adolescent and adolescent years because children are in the process of developing gender schemata. Creating gender schemata that are free of gender role stereotypes of science may be easier than altering gender schemata with previously-formed gender stereotypes of science.

3. Counterstereotypes Showing Expertise of Women Scientists

Media images of women scientists frequently have perpetuated the stereotype of science as an inappropriate activity for women by downplaying the experience and expertise of women as scientists. For example, in her analysis of biographies of women scientists in popular magazines from 1910-1955, LaFollette (1977) found that the images emphasized the domestic abilities and feminine qualities of women scientists rather than their scientific expertise. Nelkin (1987) noted in her analysis of stories of female Nobel Prize winners in the press that stories emphasized the domestic abilities of women scientists, occasionally showing pictures of them in the kitchen or commenting on their baking practices. Research also shows that media images further have discredited the expertise and experience of women scientists by showing them more often as subordinate assistants than project leaders in the laboratory (LaFollette 1988, Steinke and Long 1996).

The characteristics of women scientist role models, like their expertise in science, need to be considered in evaluations of science intervention programs. Research indicates the expertise of women scientists already has been used in media intervention programs (Steinke, in press). Demonstrating the expertise of women scientists may be important for changing existing gender schemata that do not represent women scientists as experts and leaders.

4. Counterstereotypes that Address Work and Family Issues

Media images of scientists have frequently conveyed images that present scientific careers as incompatible with marriage or motherhood. LaFollette (1988) found that magazine biographies of women scientists emphasized the extraordinary hard work and sacrifices required to be a women scientists. Nelkin (1987) found that stories about female Nobel Prize winners often mentioned the opportunities these women scientists missed by not being at home. These images suggest that extraordinary talent and tireless energy is needed to accommodate scientific careers and family. Kubanek and Waller (1995) argue that young women are aware of an image of science that emphasizes the conflict between a scientific career and raising a family. Research shows that these issues may become concerns for girls as they get older and may be looking for careers that accommodate family commitments by taking a career break or working part-time (Lightbody and Durndell 1996).

Strategies women scientists have used to successfully balance work and family responsibilities is a variable that needs further investigation in evaluations of science intervention programs. Research indicates that one media intervention program has explored this issue when featuring women scientist role models, although with mixed success (Steinke, in press). Again, direct educational intervention that shows ways of balancing work and family may be important for girls whose gender schemata feature traditional representations of gender roles.

The conditions and criteria outlined above are important variables to examine in evaluations of counterstereotypes of women scientists in science intervention programs. While research will uncover other important variables, these provide a starting point for theoretically-based evaluations of counterstereotypes of women scientists. These evaluations further will advance our understanding of the impact of counterstereotypes of women scientists on girls' perceptions of science and scientists. This knowledge is crucial for designing future intervention programs to break down the barriers that continue to contribute to the gender gap in science participation.

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Running head: MEDIA FRAMING OF POPULATION

Does Media Framing Keep Population off the Public Agenda?

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ABSTRACT

Scientists are deeply concerned over human population growth, but the American public is not. This paper shows that media framing, which typically omits mention of population growth as a cause of environmental problems, may influence Americans' indifference to population. Using doctored newspaper clippings, this experimental research shows that if media framing connected population growth to environmental problems, population would have greater salience among readers.

Does Media Framing
Keep Population off the Public Agenda?

On few other contemporary issues do scientists differ more dramatically with the general public than on the seriousness of human population growth. In 1992 the National Academy of Sciences and the British Royal Society issued a joint statement urging world leaders to take swift action to brake population growth and halt destructive environmental practices (Royal Society, 1992). That same year the Union of Concerned Scientists drafted a "Warning to Humanity" that urged a rapid transition to population stability (Union of Concerned Scientists, 1992). The latter document was signed by 99 Nobel laureates and by more than 1,500 scientists from 68 countries.

Yet that same year a Gallup poll showed that the American public was *less* aware of exponentially growing population than it had been in 1963, when the effects of population growth were far less obvious (Newport & Saad, 1992). That same poll showed that the percentage of Americans who felt that population growth would be a problem in the United States *diminished* from 41 percent in 1971 to 29 percent in 1992.

In their analysis of Americans' attitudes toward the environment from the first to the twenty-fifth Earth Day, Ladd and Bowman noted, "Concern about overpopulation as a problem for the United States has completely disappeared" (1995, p. 2).

This disparity between scientists' deepening concern and public apathy over population led well-known biologists Paul and Ann Ehrlich to grouse:

> One of the toughest things for a population biologist to reconcile is the contrast between his or her recognition that civilization is in imminent serious jeopardy and the modest level of concern that population issues generate among the public and even among elected officials. (1990, p. 13)

This contrast is even tougher to reconcile when we consider that most Americans claim to be strongly pro-environment! In a 1991 Gallup Poll (Hueber), 71 percent of Americans said they favored strong environmental regulation, "even at the risk of curbing economic growth" (p. 6). Fifty-seven percent of those polled "favored taking immediate, drastic action concerning the environment" (p. 7).

In a similarly phrased poll done by *The New York Times* and CBS, Americans were regularly asked to respond to the statement, "Protecting the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of cost." In 1981, the first year of this poll, only about 45 percent agreed with this statement. By the seventh time this question was asked, in June 1989, 80 percent of respondents agreed (Ruckelshaus, 1989).

How, then, can public support for the environment be waxing even as public concern over population growth is waning? It seems likely that Americans simply aren't connecting population growth to environmental problems. Indeed, this was the conclusion of a 1993 Pew Global Stewardship-sponsored series of 18 focus groups in 10 U.S. cities. The study sought to determine attitudes on population among 10 different voting groups, among them Jewish groups, Catholic Anglos and Hispanics, Republican women, African Americans, and young people. The study found that environmentalists, internationalists and Jewish men's groups could voice some connection between population and environment, "but overall *most of the others do not make many direct, unaided connections between population and environment*" (Pew, 1993, p. 26; italics in the original report). The Pew-sponsored report noted, "The issue of population is not invisible but most often it is a weak blip on the radar screens for most of the voting groups—with the exception of the committed environmentalists and internationalists" (Pew, 1993, p. 22).

This paper seeks to answer the question: why can scientists connect population growth with environmental problems, but the public cannot? The disparity between scientific framing and news framing is a likely explanation. A considerable body of scientific writing makes the connection between population growth and environmental damage (for example, Ward & Dubos, 1972; Spengler, 1972; Ehrlich & Ehrlich, 1990; Myers, 1991; Harrison, 1992). But recent research has shown that news stories seldom connect environmental problems to population growth. Maher (1997) has shown that almost 90 percent of news stories about environmental problems fail to connect those problems to their source in population growth. Less than one percent of his Lexis-Nexis sample of stories mentioned population stability as a potential solution to environmental degradation.

Scientists differ from reporters in how they frame environmental causality. Scientists take a wider view and consider both proximate and ultimate causes. In their view, population matters significantly as a variable affecting the environment. News stories, on the other hand, are often stereotyped (Lippmann, 1922), and they frequently fail to supply sufficient context (Bennett, 1988; Entman, 1989). Journalists tend to oversimplify explanations of causality and often ascribe more weight to individuals' influence rather than to situational variables, a phenomenon Stocking and Gross (1989) call the fundamental attribution error.

Thus when we try to deduce why scientists are so concerned about population growth while the ostensibly pro-environment public is not, the media's narrow framing of environmental problems emerges as a likely suspect. News reports of environmental problems consistently ignore the causal role of population growth, so perhaps the public similarly fails to make the connection.

But to what degree can we implicate news framing as a source of public apathy over population? After all, the flow of influence might not be from news stories to the public. The news media may simply be reflecting a broad societal distaste for any issue that involves human reproduction, and the flow of influence may indeed be from the public to the news media.

When faced with questions of causality and flow of influence, the strongest evidence comes from experimental design. In an experiment the researcher controls not merely for time-order, but also for any variables other than the experimental stimulus. That is the approach of this paper.

Framing and causality

Several recent scholarly articles affirm one of the chief premises of this study, that causal attribution is a main function of news framing. Entman (1993) noted:

> Frames, then, *define problems*—determine what a causal agent is doing with what costs and benefits, usually measured in terms of common cultural values; *diagnose causes*—identify the forces creating the problem; *make moral judgments*—evaluate causal agents and their effects; and *suggest remedies*—offer and justify treatments for the problem and predict their likely effects. (p. 52, italics Entman's)

Pan and Kosicki (1993) arrived at a similar conclusion in their summary of framing:

> Within the realm of news discourse, causal reasoning is often present, including causal attributions of the roots of a problem as well as appealing to higher level principles in framing an issue and in weighing various policy options. (p. 64)

Edelman (1993) also linked framing with causal reasoning.

Earlier work on causality and framing done by Williams, Shapiro and Cutbirth (1983), showed framing to be significant in setting the voter agenda for the Carter-Reagan election. News stories that linked issues to political campaigns produced much stronger correlation to an audience agenda of political issues, than did stories that had no campaign framing. Benton and Frazier (1976) were among the first to show that agenda-setting could extend beyond transfer of "most important problem" issue salience, and into the levels of causes and solutions.

Kosicki (1993) pointed out that agenda-setting research often conceptualizes issues as homogeneous and devoid of controversy. Such studies, he said, measure only the shell of the issue, the broad topic, rather than disparate views on the topic existing both in media content and among audiences. Kosicki and others suggested the research path this study follows: to deepen agenda-setting studies, researchers must examine framing.

Iyengar has done considerable experimental research on agenda-setting and framing. In *News that Matters* (1987) Iyengar and Kinder showed that if the media frame a given issue as the responsibility of the President, the President's popularity will rise or fall with the popularity of the issue itself. Iyengar and Kinder's series of experiments added considerable evidence of the agenda-setting power of the news media, and for a "strong effects" model of media power in general. Indeed, they claimed their experiments demonstrate instantaneous agenda-setting effects on subjects who receive relatively brief exposure to television messages. Such a claim approaches what Schramm (1971) once called the "Bullet Theory," which holds that people are easily manipulated by even brief media messages.

Iyengar's more recent studies (1989, 1991) dealt directly with news framing and public perception of causality. He showed that news framing will affect whether people perceive certain social problems (e.g., poverty, terrorism) as the responsibility of society, or the responsibility of individual poor people or terrorists. The public's attribution of causes leads to their perception of what should be done to cure social problems.

Iyengar dealt chiefly with media framing and public perception of causality in social problems. By contrast, this study examines media framing and public perception of causality in environmental problems. Does media framing keep population growth—which scientists consider an ultimate cause of environmental problems—off the public's environmental agenda, by substituting proximate causes?

Using an experiment with doctored news clippings, this study seeks to establish whether a different framing of environmental problems will produce different audience perceptions of the causes of those problems.

For the purpose of this study, the independent variable will be called *population framing*, which is defined as *language within news stories that connects population-driven environmental problems to their source in population growth*. From this the hypothesis can be stated: News stories with population framing will produce significantly higher reader salience about population growth than news stories lacking population framing.

Method

This study compares the effects of environmental news stories on a treatment group and a control group. The control group read *Austin American-Statesman* clippings about local environmental problems; the treatment group read the same material, but the clips were slightly doctored to explain the causal role of population growth (which the *American-Statesman* omitted).

This experimental stimulus was administered in 19 news stories across a treatment period of six weeks. A treatment of this duration mimics the slow accumulation of cognition that is theoretically postulated for the agenda-setting process (Shaw & Clemmer, 1977). The dependent variable, salience of the population issue, was measured through open-ended questions, Likert scaling, and a perceived-urgency scale.

The experiment employed a pretest-posttest design, although some questions were asked on the posttest only. The 42 subjects came from three undergraduate journalism classes at the University of Texas and were randomly assigned to treatment and control groups. Each group read 24 newspaper clips about environmental problems, most of them concerning endangered species, water quality and urban sprawl—issues that are clearly influenced by population growth.

The control group received a diet of news articles that were photocopies of the original *Austin American-Statesman* clippings. The treatment group received the same photocopied "clippings" with the addition of one extra paragraph (or less) that explained the role of population growth as the cause of the problem. The appendix shows examples of the doctored and undoctored clippings, as well as the full text of the population-framing paragraphs, along with their position in the stories (see pages 25-32). These paragraphs briefly connected the problem described in the news story to population growth. Nineteen of the treatment group's articles contained population framing, but six did not, so that a repetitive pattern of framing did not emerge to produce a response bias.

The minimal nature of the treatment is essential to the external validity of the study. The doctored clippings did not sensationalize the role of population growth in precipitating environmental problems. The approach was to broaden the story's causal framing by including an average of 40 additional words of context. The headlines and story layout remained the same, and only twice were the leads altered. The intent of the revisions was to provide brief additional context that was in keeping with journalistic norms of objectivity and balance.

All subjects signed a release form at the beginning of the research, after being informed that their participation would in no way affect their course grade, and that they were free to withdraw from the experiment at any time. At the conclusion of the experiment, they were informed of the nature of the research and given the results.

Study design. Internal validity should be the great strength of experimental design, if the experimenter controls for threats to this validity. Campbell and Stanley's (1963) classic work on experimental design catalogs a variety of threats to validity. This section reports how those threats were addressed.

One crucial element of true experimental design—random assignment of subjects to groups—is not a problem in "one-shot" experiments, in which subjects do not mix after being randomly assigned to treatment and control groups. This was not possible in this experiment, which continued for six weeks. In all three participating classes, control group subjects were seated next to experimental group subjects. Here the threat to internal validity was that, during the research, control group subjects would compare their clippings to those of experimental group subjects, discover the extra verbiage in the experimental group clippings, and deduce the nature of the experiment.

To reduce this risk, all subjects received their clippings twice a week in an envelope bearing their name, so that the treatment and control group readings could be kept discrete without the subjects' discovering that they were reading slightly different stories. As added insurance, the control group and treatment group received different sets of clippings on any given day (with the exception of the first and last group of clippings). Subjects were asked to return the clippings on the following class meeting, so that the clippings could be recycled with other classes. This procedure reduced the risk that control- and treatment-group clippings were in circulation simultaneously, available for comparison. This was successful; in the post-experiment debriefing, no subjects said they had compared their clippings and deduced the purpose of the experiment.

Subject mortality and fatigue. Random assignment usually controls for subject mortality, and performed well in this experiment. Two subjects dropped out (by virtue of dropping the course involved in the experiment); each was from a different group. However, subjects were asked to read their clippings on their own time (rather than in class), which presented a different kind of mortality: perhaps subjects simply would not read the clippings. This threat is sometimes termed subject fatigue or interaction of the treatment and the subject.

To reduce this latter threat, on their initial consent form subjects were offered a free pizza and drink for their participation. They were informed in writing and orally of the nature and duration of the experiment, and they were told they were under no pressure to participate. They signed a statement indicating their intention to participate. Additionally, the researcher personally distributed the clippings to the subjects twice a week, and frequently urged participants to keep up with the readings.

Additionally, the researcher spot-checked the reading rate by enclosing in subjects' envelopes a note for them to initial, indicating they had read the clippings. These unannounced spot-checks were done during the first and fourth weeks. Although not all subjects initialed the spot-check notes, roughly three-fourths did, with no significant differences in response rate between the groups. On the fourth-week spot-check, those who did not return an initialed note were given another unannounced note to initial in the following batch of clippings. Only two subjects failed to initial this follow-up note. As a final line of defense against an unbalanced rate of reading between the experimental and control groups, subjects were asked on the posttest to indicate the number of clippings from which they had read at least six paragraphs. The means of these self-reported reading rates were very close (18.05 clippings read by the control group and 18.33 by the experimental group), and the differences were not statistically significant.

Demand characteristics. Perhaps the chief threat to this experiment comes from experimental subjects' inferring the nature of the research, and altering their answers based on this inference. Demand characteristics could come from the pretest or from subjects' suspecting that the clippings had been altered.

To keep the pretest from "telegraphing" the experimental focus on population growth, questions about population were mixed with questions about other environmental issues (e.g., toxic waste, global warming, nuclear power). Further, two questions on the pretest and three questions on the posttest were open-ended questions that made no mention of population growth. Moreover, the six-week duration of the treatment should have dampened the effect of pretesting on posttest answers—as opposed to shorter-duration experiments whose pretests would be fresher in participants' minds.

Additionally, two questions on the posttest were not present on the pretest. This prevented demand characteristics from biasing those posttest answers. Posttest-only answers are valid because random assignment evenly distributes any preexisting biases.

The treatment itself could possibly produce demand characteristics, since the experimental group was reading about a series of population-driven environmental problems, and those problems were framed as the consequence of population growth. To keep this pattern from becoming obvious to subjects, 5 of the 24 clippings had nothing to do with population-driven problems. They were about solar energy, anti-environmental groups, litter cleanup of Austin's Town Lake, President Clinton's wetlands policy, and Americans' attitude toward endangered species. These "decoy" clippings were spaced through the experiment to break up the pattern of population-framed articles, and thus prevent response bias.

Another defense against demand characteristics was the realism of the clippings (see appendix for examples). The researcher affixed desktop-published columns of text over the original text, and photocopied the results, keeping intact the original *American-Statesman* headlines, charts, photographs, and even clipped-out remnants of adjacent stories. A control-group clip is virtually indistinguishable from a treatment-group clip, except for the added verbiage. When asked in the post-experiment debriefing, none of the subjects said he or she had suspected the deception.

One of the chief defenses against producing demand characteristics is the minimal nature of the treatment itself, as discussed earlier. In a sense, this experiment was a test of the assertion: could a mere 40 words of contextualization, repeated about three times a week, make a difference in audience cognition? These 19 lightly doctored stories seem a weak experimental stimulus, spaced as they were across six weeks. But one purpose of this experiment was to determine whether a paragraph of contextual framing—when repeated regularly—could affect participants' perceptions about the importance of population growth.

For the experiment to have external validity, the treatment had to be within the bounds of plausibility for today's journalism. The wording and placement of the inserted statements were as natural as possible, and flowed within the overall context of the story. The treatment clippings had the look and feel of a normal news story. Had the treatment involved altering headlines, it would likely have produced even stronger results—but results that news organizations might consider propagandistic or advocacy journalism, or at least beyond their scope. (The full text of the added verbiage is presented in the appendix.)

These precautions against demand characteristics seem to have been successful. Participants were asked on the posttest, "...what do you think the purpose of this experiment has been?" No subject mentioned any suspicion that the clippings had been altered. Almost all subjects repeated what they had been told about the nature of the research, that it sought to measure how people learn about the environment from newspapers over an extended period of time.

Results

As Iyengar and Kinder (1987) did, this study measured the effects of framing with open-ended "most important problem" questions, as well as by other close-ended measures. The clearest distinction between control and experimental groups was respondents' answers to the open-ended "most important problem" question, a question that is frequently used to measure agenda-setting effects. This posttest-only measure clearly shows that standard media framing is capable of keeping population growth off the agenda of issues that newspaper readers consider important. And conversely, this measure shows that a mere paragraph of population framing, administered over time, is capable of making readers aware of the importance of population growth in precipitating environmental problems.

The following pages show the results of each measure. A general discussion of the experiment follows on page 18.

I. Posttest-only responses to open-ended questions.

Figure 1

Austin's Most Important Environmental Problem.

Subjects were asked: *What do you think is the single most significant environmental problem in Austin? What do you think causes this problem?*

Chi-Square analysis; 1=mention of population growth as the most important problem or as the cause of the problem; 0=no mention of population growth as problem or cause.

Discussion. This measure—modeled on the traditional agenda-setting dependent variable "MIP question" — produced the best posttest difference between treatment and control groups. It clearly demonstrates the agenda-setting power of just a paragraph of framing, when that message is repeated over time.

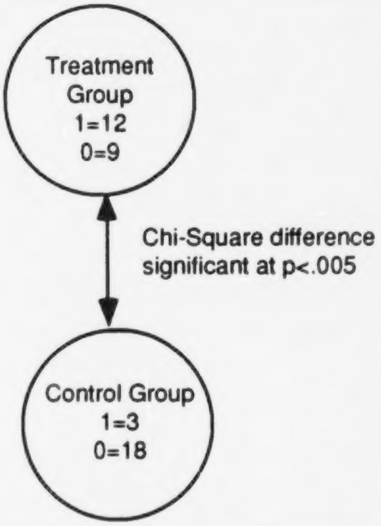
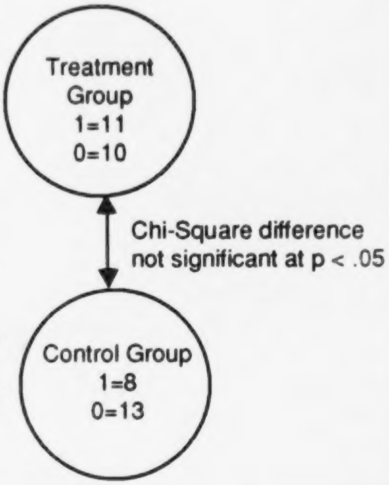


Figure 2

Mention of population growth as a cause of habitat destruction.

Subjects were asked to indicate what they felt causes *conversion of wildlife habitat into subdivisions.*
Chi-square analysis; 1=mentions population growth; 0=no mention of population growth.

Discussion. While the treatment group mentioned population growth more frequently than the control group, the differences were not statistically significant, probably for two reasons: (1) college students in the control group were environmentally savvy enough to offer this explanation without being told by the media; (2) with a low number of subjects, between-group variability must be quite high to produce statistical significance. A higher *n*, or a less sophisticated set of subjects, would likely produce significant differences.



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II. Pretest-posttest responses to open-ended questions

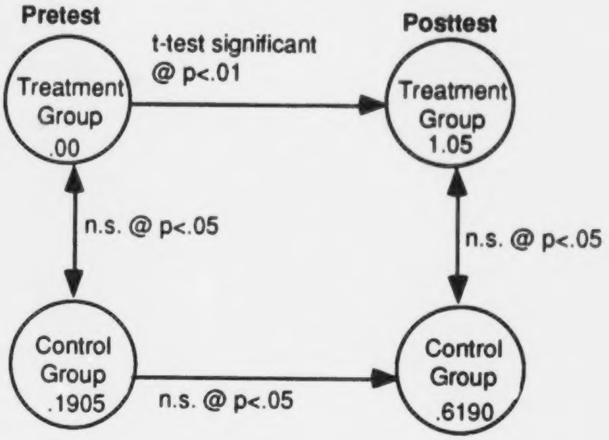
Figure 3

Ranking the world's most important environmental issues

Independent- and dependent-group t-test analysis. Subjects asked to list up to four issues on an open-ended question: *What would you say are the world's most important environmental issues?*

If population were ranked first, this was scored as 4; if second, scored as 3; if third, 2; if fourth, 1; if absent, 0.

Means between groups were compared using independent-groups t-tests. Means within the same group from pretest to posttest were measured using dependent groups t-tests. Means are given within the circle representing each group.



Discussion. The significant pretest-posttest difference in the experimental group is good evidence of the power of media framing, particularly when the control group difference from pretest to posttest is not significant at the p<.05 level. Nevertheless, the control group mean gains ground from pretest to posttest—chiefly the result of one control group subject ranking population 0 on the pretest and first (a score of 4) on the posttest. With the low numbers of subjects, this posttest gain by the control group erases statistical significance between the groups on posttest scores.

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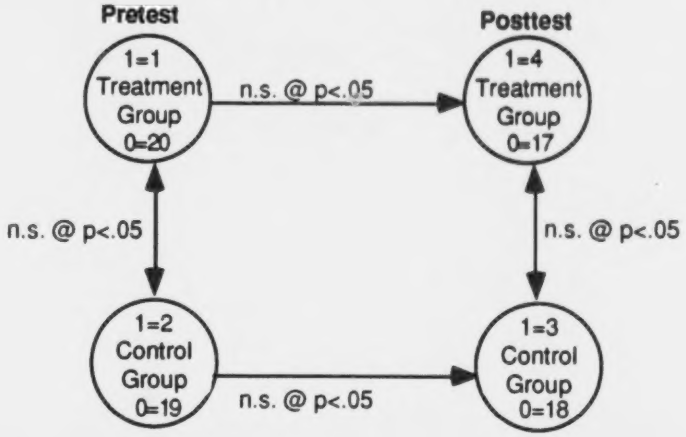
Figure 4

Linking of population growth to endangered species controversy

Chi-square analysis. Subjects were asked: *What do you think* **causes** *the following environmental problems?* For endangered species, results are given below. 1=mentions population growth; 0=no mention of population growth.



Discussion. This question seems to have stumped most subjects, and produced no significant results in any direction. This is not surprising in the control group. As Bennett (1988) once put it, "Few people who turn to the news as their main source of information can offer useful explanations for what is going on in the world....The virtual absence of explanation or analysis in the news leaves the origins of events shrouded in mystery" (p. xiv).

The treatment group, however, should have shown significant gains in subjects who were able to connect endangered species problems to population growth. The inserted paragraphs (see Table 1) contained frequent statements of causal connection.

It is also curious that with a different environmental problem (water shortages, Measure 5 on the next page), both treatment and control groups were able to link the problem to its source in population growth.

Two explanations are possible. First, the causal linkage from population growth to endangered species is less direct than it is with water shortages. People directly consume water, and the more people, the more water consumers. But endangered species are seldom "consumed" directly by expanding populations; rather, their habitat is altered by population-driven development. Perhaps subjects had trouble following this longer causal chain.

Second, the experimental stimulus may simply have not been strong enough. Perhaps a longer "trend story" or two may be necessary, in addition to paragraph-length causal framing, to produce significant change in the experimental group.

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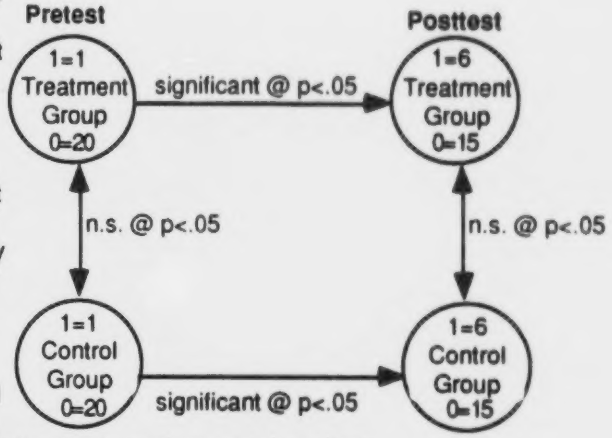
Figure 5

Linking of population growth to water shortages

Chi-square analysis. Subjects were asked: *What do you think* ***causes*** *the following environmental problems?* The results for water shortages are at right.

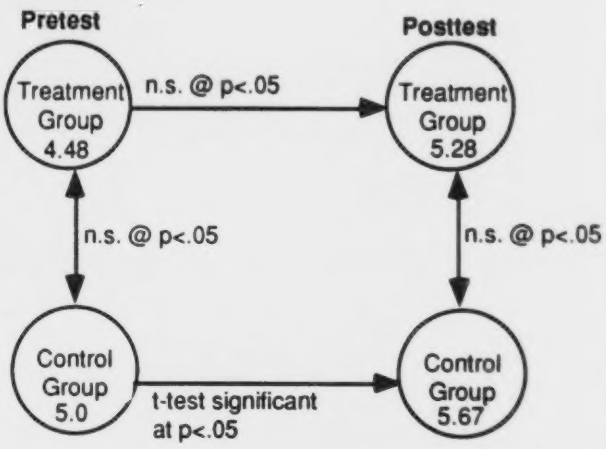

Pretest
Posttest
1=1
Treatment
Group
0=20
significant @ p<.05
1=6
Treatment
Group
0=15
n.s. @ p<.05
n.s. @ p<.05
1=1
Control
Group
0=20
significant @ p<.05
1=6
Control
Group
0=15

Discussion. Both groups scored equally on pretest and posttest. One of the two control group clippings that mentions population growth does so in the context of water shortage (story #20, "Humans share threat of aquifer loss with wildlife.") This may have affected the control group answers. It seems likelier that the control group's education may have supplied this knowledge of causality, perhaps in interaction with subjects' sustained attention to environmental readings.

Figure 6

Urgency scale of environmental problems

T-test analysis. Subjects were asked: *Please indicate your feelings about the urgency of remedial action for the environmental issues below. The higher number you check, the more urgent the remedial action.* Scores are ratings for population growth, and range from 1 (not urgent at all) to 7 (very urgent). They were analyzed for significant differences using t-tests.


Pretest
Posttest
Treatment
Group
4.48
n.s. @ p<.05
Treatment
Group
5.28
n.s. @ p<.05
n.s. @ p<.05
Control
Group
5.0
t-test significant
at p<.05
Control
Group
5.67

Discussion. Even though the treatment group mean gained more from pretest to posttest—a mean gain of .8 compared to the control group's gain of .67—the treatment group's gain was not significant at the p<.05 level, while the control group's gain was significant at this level! A glance at the standard deviations reveals the problem. The experimental group deviation was 2.136, versus the control group's deviation of 1.426. This high deviation results from two experimental group subjects whose urgency scale scores dropped dramatically from pretest to posttest—one from 7 to 4; another from 4 to 1.

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Figure 7

Likert scale rating of the effect of population growth on the Austin environment

T-test analysis. Subjects were asked to respond to the statement: *Population growth degrades the Austin-area environment.* (Scores range from 5=strongly agree to 1=strongly disagree.)

Discussion. The treatment group scores gain at a high level of statistical significance, but the control group scores also gain significantly, negating the expected significant differences between the groups on the posttest.

These results and results of Measure 3 indicate that population framing may produce a stronger effect on subjects than standard media framing, but with this small number of subjects, the posttest scores are not different enough to implicate framing as the sole cause of the differences.

A higher number of subjects and a less knowledgeable set of subjects may produce more cleanly defined differences on the posttest. Perhaps a posttest-only measure may produce better results as well.

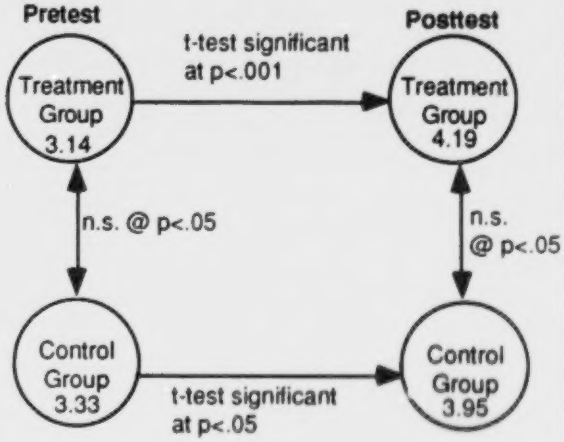
Pretest
Posttest
Treatment Group 3.14
t-test significant at p<.001
Treatment Group 4.19
n.s. @ p<.05
n.s. @ p<.05
Control Group 3.33
t-test significant at p<.05
Control Group 3.95

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Table 1. Summary of experimental findings

Posttest-only responses

	Pretest : PostTest differences between control and experimental groups
Figure 1 Austin's Most Important Environmental Problem	Significant at $p<.005$
Figure 2 Mention of population growth as a cause of habitat destruction	n.s.

Pretest-Posttest responses

	Significant differences between pretest and postest measures*	
	Experimental Group	Control Group
Figure 3 Ranking population among the world's most important environmental issues	Significant at $p<.01$	n.s.
Figure 4 Linking population growth to endangered species	n.s.	n.s.
Figure 5 Linking population growth to water shortages	Significant at $p<.05$	Significant at $p<.05$
Figure 6 Urgency scale of remedial action for population growth	n.s.	Significant at $p<.05$
Figure 7 Effect of population growth on the Austin environment	Significant at $p<.001$	Significant at $p<.05$

**Posttest differences between treatment and control groups significant only on measure 1.*

Discussion

Although some experimental measures produced more clear-cut results than others, the data indicate that media framing has considerable power in telling people how to think about an issue—particularly with regard to causality. Considered against all the other stimuli that the subjects received across the duration of the experiment, it seems remarkable that 19 paragraphs spaced across six weeks could produce such strong results on the "Austin MIP" question (Figure 1). Since this was an open-ended question that was administered on the posttest only, subjects' answers were very unlikely to have been biased by any demand characteristics. The open-ended Most-Important-Problem question is frequently used as a measure of how media messages influence the public agenda. This measure is solid evidence that standard media framing—the undoctored *American-Statesman* clippings—keeps population low on readers' agenda; while population framing—the doctored clips that implicated population growth as a source of the problem—could advance population higher on readers' agendas of important environmental problems.

Figure 3 also shows good evidence that media framing affects issue salience. In ranking the world's top environmental issues, the treatment group ranking of population growth increased from a pretest mean of 0.00 (no ranking within the top four issues) to a posttest mean of 1.05, a difference significant at the $p < .01$ level. The control group ranking of population did not change in a statistically significant manner.

In general the numbers produced by this experiment were going in the right direction toward producing significant differences from pretest to posttest with the treatment group. On most measures the treatment group "out-gained" the control group with regard to perceived importance of population growth. However, it *is* troubling that the control group scored significantly higher from pretest to posttest in measures 5, 6 and 7. This contravenes research expectations. Gains by the control group may be attributable to reactivity from the pretest. Perhaps control group subjects were conditioned by the pretest to be more attentive to environmental causality, knowing they would be tested again.

Despite the inconsistent performance of some measures, this study generally shows that media framing can affect the public's agenda with regard to the importance of population growth as an environmental issue. Generalizing toward media theory, this experiment provides a benchmark regarding how *strong* newspaper framing must be in order to produce results over an extended time. A paragraph of contextualization, repeated 19 times across six weeks' coverage of environmental issues, is sufficient to move population growth high on subjects' agenda of salient environmental problems.

Generalizing toward the everyday work of journalists, these results suggest the importance of pursuing causality in any issue beyond dramatic, easily identifiable, proximate causes. Bennett (1988), Entman (1989) and others have shown that media content frequently neglects context and explanation. This causal blindness, on a macrocosmic scale, may lead Americans toward a palliative agenda, and may keep cures off Americans' agenda. These results also question journalists' claims (Maher, 1997) that they don't have the space to implicate population growth in local environmental stories. No elaborate definitions of terms were necessary to frame the causal effects of population growth; each story needed an average of only 40 words to produce significant posttest results. The full text of the 19 population-framing passages are presented in Table 1 in the appendix.

Of course, with experimental results the researcher must always be cautious about generalizing in *any* direction. Studies that use college students as subjects are frequently criticized for weak external validity. But in this experiment, using college students arguably *dampened*, rather than enhanced, the results. Because many of the subjects were environmentally concerned and well-read to begin with, their pretest measures left less room for change on the posttest. The lack of statistical significance between control and treatment group on several posttest measures could also be attributable to the use of college students as subjects: the control group may have been population-savvy enough to deduce without being told by media stories that the problems they were reading about were driven by population growth. Iyengar and Kinder's (1987) experiments show that less educated subjects are more tractable to media influence.

The artificial circumstances under which the students read the clippings may also limit the generalizability of this study, since the subjects may have read the clippings with heightened attention, knowing they would be tested on what they learned. But such a criticism can be leveled at most experiments that measure how people learn from the news. Certainly Iyengar and Kinder's (1987) experiments using doctored television programs measured responses of subjects whose attention had been stimulated by traveling to the Yale campus to participate in a paid experiment.

As with any experimental results, the generalizability of these results will be strengthened by replicating the study with different kinds of subjects. Future experiments of this nature should also seek to vary the strength of the treatment. This could be done by altering the duration of the same treatment, or by creating a stronger treatment itself (for example, inserting a "trend story" among the treatment clippings, to provide more than a paragraph of causal explanation).

Returning finally to environmentalism, if population framing can indeed sharpen the American public's understanding of our environmental predicaments and move population growth higher on newspaper readers' agenda, these results are of more than academic interest. Population growth is real and is now degrading the environment on a massive scale.

In many ways, the *true* experimental stimulus has not been the 19 doctored clippings reported in this study. Rather, the stimulus has been the pervasively repeated pattern of framing throughout the news media for many years, a pattern that consistently omits the causal role of population growth in precipitating environmental problems (Maher, 1997). This pattern is not found in science writing. Constricted media framing has created a naturally occurring experiment that demonstrates the power of the news media to keep Americans myopic about a major underlying cause of many environmental problems.

Americans care about the environment, but they are not connecting environmental problems to population growth. And because population is not a valence issue with most Americans, in 1996 Congress cut U.S. assistance for international family planning programs by 30%, despite the fact that in his book *Earth in the Balance* the current Vice President listed population stability as his first strategic goal to save the global environment (Gore, 1992).

While this paper shows mixed results on some measures, at the agenda-setting level it clearly suggests that, if news framing agreed with scientists' framing and consistently implicated population growth as a cause of environmental problems, Americans would share scientists' urgency about stabilizing our soaring population growth.

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Appendix

Table 2. Full text of the added verbiage in all treatment-group clippings

1. Algae Bloom
Paragraph 2: The golf course and residential development, in turn, are caused by Austin's booming population growth, according to real estate experts.

2. Sun City Looking at Williamson
Paragraph 2: The development could convert several thousand acres of farm land and wildlife habitat into urban sprawl. According to real estate experts, this land development process is ultimately driven by population growth.

3. Guadalupe Bass Population Declining
Lead sentence: In response to growing human population....Paragraph 4: These factors, however, have a deeper cause: human population growth, which inevitably alters nature for human purposes.

4. Rush Hour Traffic
Paragraph 3: The ultimate cause, of course, is Austin's booming population growth. As people numbers go up, so do car numbers and traffic. Subhead: "As Austin grows its roads are getting clogged" changed to "Austin's growing population clogs roads."

5. Cat Mountain
Paragraph 5: Both environmental and real estate experts agree that population growth is a prime cause of development. Development, in turn, can destroy the habitat wildlife need to survive. Zoning may delay development, but stabilizing human population is the needed long-term solution, environmental experts say.

6. Developers File Applications
Paragraph 4: The developers are responding to population pressure. As more people move to Austin, they create rising demand for home sites. This makes it more and more profitable to turn wildlife habitat into human habitat.

7. Salamanders Endangered
Added to Paragraph 6: Austin's rapidly growing population makes the challenge even steeper. Population growth creates a rising demand for housing; this in turn provides the economic incentive to develop land.

8. Judge's Priorities Questioned
Paragraph 5: While environmentalists and developers blame each other, ultimately the problem results from another source: population growth in the Edwards Aquifer region. While the average fresh water supply has remained fairly constant, human numbers have grown tremendously. Limiting population growth is the best way to ensure stable water supplies for the future, according to some environmental experts.

9. Lake Pointe Project
Paragraph 3: Land development will destroy or disrupt the endangered birds' habitat. According to Larry Goodkin, real estate expert, a primary determinant of land development is population growth. "Growth in population creates a need not only for housing, but also for supporting real estate facilities such as shopping centers, service stations, medical clinics, schools, office buildings, and so on."

10. Wildlife Management Changes
Lead paragraph: "...pressures from modern society" changed to "....pressures driven by an expanding human population."

11. Salamanders Off List
Paragraph 2: With Austin's growing population, realtors stand to make a great deal of money by converting the Barton Springs recharge area into subdivisions. Conversely, realtors stand to lose a great deal of the salamander is declared endangered, because this might limit development.

12. Anti-Environment Scare Tactics
No added verbiage. A decoy clipping.

13. Butterfly Gardens
Paragraph 5: Curbing human population growth would help curtail this destruction of butterfly habitat, as well as the habitat of most wild species.

14. Town Lake Deserves Cleanup
No added verbiage. A decoy clipping.

15. Preserve Bill
Paragraph 3: The preserve will ensure that some wildlife habitat remains undisturbed, but overall the county will experience a net loss of wild land, as development turns wildlife habitat into human habitat. Austin's rapidly growing population provides the economic stimulus for this development. "In general, land prices are the resultants of population," said real estate expert Ira Cobleigh. "As more people come on a given section of land...they create a demand for living space, land and structures."

16. Solar Energy
No added verbiage. A decoy clipping.

Continued on next page

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Appendix

Table 2, continued.

17. Illegal Clearing of Habitat
Paragraph 2: Although most of the reported clearing was not illegal, wildlife habitat around Austin is vanishing rapidly in response to the city's growing population. During the 1980s Austin was the fastest-growing metropolitan area in Texas, with a 45.6 percent population increase. Population growth creates the economic demand for turning wildlife habitat into subdivisions.

18. Austin Must Curb Growth
Paragraph 4 (an op-ed piece): Managed growth rarely succeeds because it ignores the ultimate cause of wildlife habitat destruction: human population growth. We can stabilize our population without drastic measures. We can reduce immigration, which accounts for more than half of our nation's population growth, and we can make birth control free and accessible. As long as our species grows, we will continue to push into the habitat of other species.

19. Clinton Wetlands Plan
No added verbiage. A decoy clipping.

20. Humans Share Aquifer Loss
Paragraph 5: Environmental experts agree that water shortages worldwide are caused by population growth, as well as by growing consumption. Although new water sources can sometimes be tapped—new reservoirs, for example—if population remains unchecked, water shortages will inevitably return.

21. Americans Value Endangered Species Unequally
No added verbiage. A decoy clipping.

22. Warbler/Vireo Threatened
Paragraph 3: Recovery costs for endangered species can be viewed as a hidden cost of human population growth. Most species become endangered when their habitat is reduced by development. But development in turn is driven by population growth. Austin's expanding human numbers have created the economic incentive for developing vireo and warbler habitat.

23. Construction Changes Communities Near Austin
Paragraph 4: As a result of the area's rapidly growing population, Round Rock and other once-rural towns have begun to experience a building boom. But some residents find this changes the solitude and tranquility they had once enjoyed.

24. Rio Grande
Paragraph 4: What has happened to the Rio Grande is the natural consequence of population growth. As millions of people moved along the river, they changed it from its natural state to suit their needs.

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Appendix

The following five pages are samples of the 19 clippings that include population framing. Each is labeled "EG" or "CG" to indicate whether the clipping went to the experimental group or to the control group. The added verbiage for the experimental group is bracketed. The following pages will not be numbered so that the clippings can be reproduced at 100 percent size.

An Elite Scientist at the Boundary: The Power of Evidence and the Evidence of Power in Media Coverage of Science

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Abstract

An Elite Scientist at the Boundary: The Power of Evidence and the Evidence of Power in Media Coverage of Science

The media are likely to dismiss a scientist who questions the standard scientific worldview. But how do the media respond when an *elite* scientist questions the reductionist paradigm? In describing his research into the alien-abduction phenomenon, Harvard Medical School psychiatrist John Mack has suggested that the conventional paradigm may be inadequate. Press accounts of Mack's work with abductees reveal how journalists and scientists have attempted to protect the boundaries of the "black box" of science.

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An Elite Scientist at the Boundary:
The Power of Evidence and the Evidence of Power
in Media Coverage of Science

Abstract

How do the media respond when an elite scientist steps outside the boundaries of "real" science? Harvard psychiatrist John E. Mack's research into the alien-abduction phenomenon has drawn the attention of fellow scientists and the media. Press coverage of his abduction studies may reveal how the media participate in defining the boundaries of science.

Mack is a member of the scientific elite: a tenured member of the Harvard Medical School faculty, Pulitzer Prize winner, and well-known authority in his field. In public statements about his abduction work, he has asserted that this research is legitimate. He also has raised questions about the utility and validity of the standard scientific paradigm; scientists and journalists appear to find these questions unsettling or even unacceptable.

Analyzing media coverage of Mack's abduction research will improve understanding of how scientists use the media to fend off challenges to their sanctioned world view and how the media play a role in maintaining the cultural authority of science. Perhaps the gravest kind of threat to power is a challenge from within the power elite: dissecting media treatment of Mack, an elite scientist, will provide some new insights into how the scientific elite operates within the media-culture-power triad.

The method employed for this study is close textual analysis of stories about Mack's abduction research published in selected high-circulation daily newspapers. The analytical framework applied is social constructivism, focusing on the concept of boundary work, a useful tool in the study of the origins and maintenance of the power of science.

Boundary work can show how scientists make use of the media to establish and reinforce their

cultural authority. The Mack/abduction story is worthy of study as it should shed some light on an aspect of boundary work not yet documented in the literature: a case involving an elite scientist who has engaged in what his peers deem deviant research, questioned fundamental elements of the standard scientific paradigm, and spoken freely with the media about his work and his views.

This analysis considers how the media depicted Mack before and after he became involved in abduction research. How did other scientists talk to the media about Mack before and after his involvement in this work? How and why did the media decide that Mack's alien-abduction research was news? How did Mack use the media in attempting to legitimize his abduction work and defend himself against critics? How did Mack's peers use the media to marginalize his research? What kind of tactics did Mack and his opponents employ in the media as they were doing their boundary work?

This analysis also necessarily addresses how "science" is socially constructed -- by the media, Mack the maverick, and Mack's elite peers. Have the media covered Mack's abduction research as science? If so, how have they defined his work as science? If not, how have they defined it as not-science? How has Mack defined his work as science? How have Mack's critics defined his work -- science or not-science?[1]

News stories generally have conveyed the impression that Mack has crossed the boundary that scientists maintain between legitimate and illegitimate science. This analysis addresses whether and how the media participate in defining reality: what is and is not "real," legitimate science and who is and is not a "real," legitimate scientist and ultimately how scientists use the media to reinforce their power.

Introduction

Communication is the symbolic process of creating, maintaining, and transforming reality. (Carey 1992) The mass media play a powerful role in creating reality by defining and describing it, shaping the ideological environment and thus creating public consensus. (Hall 1982) The media reflect and create culture, which is the structure that embodies meaning and value in society and enables the existence of power. (Van Zoonen 1994)

Media content is both a source and a manifestation of culture, a form of cultural mapping that can reveal ideological bias or emphasize deviance from the "norm." (Shoemaker and Reese 1996) The media play an essential role in establishing and maintaining the relationship between culture and power by identifying and affirming socially constructed norms.

Research has shown, for example, that media content leans heavily toward "official" stories and that journalists routinely tend to rely on "official" sources who are inclined to maintain the status quo; these practices constitute one way in which the media participate in defining and redefining norms and, thus, deviance. (Ericson et al 1987) As agents of social control, the media do not screen out deviant ideas but identify them as such and even belittle them in the process of reaffirming the ideological status quo. (Shoemaker and Reese 1996)

The scientific elite may use the media in the process of dealing with the threat of dissention in the ranks, labeling those who do not conform to the status quo as deviant and often ridiculing or dismissing them. The case addressed by this analysis involves deviance from the norm within the elite: a member of the scientific elite has questioned the utility of the standard reductionist scientific paradigm. This kind of challenge seems to be especially unsettling, questioning as it does the ontological, epistemological, and phenomenological norms of science.

Harvard Medical School psychiatrist John E. Mack has presented such a challenge to the reductionist paradigm in reporting to the public on his research into the alien-abduction phenomenon. How have the media responded, and how have scientists reacted in the media, to this elite scientist's venture along the boundaries of science?

In the post-Cold War environment, the science community appears to be feeling a little shaky about its cultural authority. The so-called "science wars" are no doubt a product of this unease and a significant element of the social and intellectual milieu in which the case under study in this analysis has unfolded.

Mack, the media, and other scientists via the media have been describing Mack's abduction work in ways that question or defend the conventional boundaries of science. While the media have been reporting on Mack's work in a way that frames it as "deviant" science, Mack has explained his work to the media within the accepted reductionist framework of science -- even while questioning the value of that very framework. This analysis examines how the various players in the Mack case have been communicating about "science."

A close reading of news stories about Mack published in elite daily newspapers shows that journalists, and other scientists speaking to journalists, are concerned about evidence, competence, interests, and world views. Evidence appears to have been of special interest: it is a tool for building and maintaining the boundaries of science, one that both boundary-tending and boundary-challenging scientists and journalists employ in validating or dismissing claims.

What evidence (or the lack thereof) does is establish whether information resides inside or outside the so-called "black box" of "science" -- that is, whether it may be labeled "real" and legitimate. Consequently, evidence is what other scientists and the media repeatedly have demanded of Mack. In short, they have been questioning Mack's scientific authority. To better understand the origin and nature of the cultural authority of science, it is important to understand who has the authority to decide what counts as valid scientific evidence and how such decisions are made.

Questions about Mack's competence have tended to center on such indicators as credentials, methods, and interests. The media generally have not challenged Mack's credentials directly in questioning his competence. Ironically, it may be the case that recitation of Mack's credentials -- no single piece on Mack and his studies fails to mention that he is a member if the Harvard Medical School faculty and a Pulitzer Prize winner as well --has functioned as a sort of media insurance, a justification for not dismissing him altogether.

In addressing competence, many articles have questioned the legitimacy of some of the methods that Mack has employed in his abduction research, such as holotropic breathwork and hypnosis.[2] Most articles have mentioned Mack's engagement in one or more of the following interests, generally framed rather as "negative credentials": Erhard Seminars Training (EST), Eastern philosophy and religion, environmentalism, and antinuclear activism. Some stories have challenged Mack's competence by alleging that he has led subjects to believe they have been abducted.

A number of stories implicitly have criticized Mack for engaging in publicity. At the time Abduction was released, Mack had not yet published any papers on his abduction research in mainstream scientific journals or presented his findings at a mainstream scientific conference. (He had, however, published in journals and spoken at conferences relating to the so-called science of "UFOlogy.") In publishing a book about his research and pitching it to the general public, Mack broke a rule of science: first submit findings to peer review, then take them to the public. He also violated a corollary to this rule: real scientists do not seek publicity.

Most stories reviewed for this analysis have made mention of Mack's world view in ways which clearly indicate that it conflicts with the standard scientific world view. Again, while these stories have not necessarily rejected Mack's view, they have not endorsed it, and most imply that Mack's view is problematic.

For people who claim that unidentified flying objects (UFOs) may be visiting earth and that extraterrestrial intelligent beings may be abducting humans, news stories about Mack and his abduction research are about a legitimate scientist who is validating their claims. For scientists and other skeptical readers, these stories are about what counts as science and what does not and who has the authority to make such decisions. For journalists, this story may be about reinforcing or redefining the boundaries of science. Or it may simply be about producing good copy.

Strategy for analysis: leading newspapers

This analysis is based on news stories about Mack's abduction research published in a handful of elite daily newspapers: the New York Times, Washington Post, Boston Globe, Boston Herald, Los Angeles Times, and Chicago Tribune. These newspapers were selected because they are high-circulation and pace-setting (the Boston Herald was included because it is local to Harvard).

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The analysis also has encompassed some of Mack's own writing, for comparison.[3] The method of analysis employed was close reading of content, from the perspective of social constructivism.[4]

Stories submitted to analysis were extracted from a total of 187 news items about Mack found by a Lexis-Nexis search for January 1, 1992 through December 31, 1995; along with 26 stories found by a separate Lexis-Nexis search from the beginning of the database through December 31, 1991.[5] (Thus, stories were divided into "before" and "after" groups.[6])

Analysis of these texts shows that over the past six years, media criticism of Mack, from journalists and from scientists speaking to journalists, has focused on competence, credentials, credibility, methods, evidence, interests, publicity and paradigms. Criticisms have been explicit and implicit. On his part, Mack appears to have been fairly consistent in explaining his work and responding to media criticisms: in general, by continually restating and justifying his claims and, in particular, by rewriting his book for paperback publication in order to respond to specific criticisms *(see below)*.

In talking to the media about his abduction work, Mack has been challenging *and* defending the boundaries of conventional science. His boundary-maintenance work has aimed to reinforce his status as a legitimate scientist doing legitimate research. Mack has said that he first became engaged in abduction research, and has remained engaged, because he was not, and still has not been, able to offer a scientific explanation for the phenomenon. The implication is that he intends to stick with his line of inquiry until he can explain exactly what is happening or prove it is not "real." At the same time, Mack has been engaging in boundary skirmishes with his peers, trying to expand "science" to encompass ideas that do not fit within the reductionist paradigm.

A 'deviant' elite scientist in the news

Harvard Medical School psychiatry professor John E. Mack has been well known in his field for 25 years, and with good reason. He established a department of psychiatry at Cambridge Hospital in 1969, published Nightmares and Human Conflict in 1970, received a Pulitzer Prize in 1977 for his psychobiography of T.E. Lawrence (a.k.a. Lawrence of Arabia), co-founded the Center for Psychology and Social Change at Harvard Medical School in 1983, and served as an editor for a handful of books including Borderline States in Psychiatry and Human Feelings: Explorations in Affect Development and Meaning.

There is no question that Mack is an accomplished and properly credentialed -- that is, real and legitimate -- scientist by most standards, and journalists and peers have called upon him over the years as an authoritative source on matters such as nightmares, child suicide, and political psychology.

In 1990, Mack began investigating the alien-abduction phenomenon, conducting psychiatric interviews with people who claimed they had been abducted by extraterrestrial intelligent beings. In June 1992, he co-chaired a conference at the Massachusetts Institute of Technology on the alien-abduction phenomenon, apparently the first event that sparked media interest in Mack's research:

- In April 1994, the established New York publishing house Simon and Schuster issued a book on Mack's current work, Abduction: Human Encounters With Aliens. At this point, Mack had not published any papers in mainstream scientific journals or delivered any presentations at scientific conferences on his abduction research.[7]
- In May 1994, Harvard Medical School initiated an investigation of Mack's abduction research.[8] According to Harvard Vice President James Rowe, the investigation was not "a case involving misconduct or discipline" but "an ongoing review of Dr. Mack by senior faculty, in a peer review process...looking at his research methodology." Arnold Relman, leader of the investigation and a former editor of the New England Journal of Medicine, said the review was a response to claims which Mack had made about his abduction research "that were not backed by evidence submitted to scholarly journals." (Orlans 1995)
- In May 1995, Abduction was reissued in a mass-market paperback edition (with a reported print run of 200,000), revised and with a new preface and appendices.
- In August 1995, the medical school announced that its investigation had not yielded any evidence that Mack was engaging in bad science. The Skeptical Inquirer -- a magazine published by the Committee for the Scientific Investigation of Claims of the Paranormal, many

of whose members are dedicated UFO-alien debunkers and critics of Mack's abduction research – reported that the medical school had "admonished Mack to avoid violating its standards of conduct in his clinical research, but also stated that they have yet to find Mack violating these standards." (Emery 1995)

These events drew press attention and created opportunities for Mack and his supporters and opponents to engage in boundary work around their science; examining media coverage around these events yields a record (albeit incomplete) of that work.

Boundary work, 'science,' and the media

Analyzing how the media have dealt with various claims and counterclaims about Mack's abduction research will help to explain the role of the media in boundary work. Media coverage of Mack's work provides an excellent illustration of how "journalists join with other agents of control as a kind of 'deviance-defining' elite," defining and redefining the boundaries of acceptable behavior in all spheres of life -- in this case, in science. (Ericson et al 1987)

But first, in order to proceed with this analysis, it is necessary to consider: what exactly *is* "science" in this case?[9] Defining, explaining, and understanding the construct of "science" is critical to analyzing the relationship between science and the media -- media treatment of science, the role of the media in the public understanding of science, the ways in which scientists use the media to disseminate information about their work.

By conventional definition, "science" is a body of objective knowledge or a method for obtaining such knowledge. This conception of science embodies the elements of description, explanation, experimentation, and (sometimes) understanding, and it justifies the reductionist world view that all phenomena can be explained by examining them in their parts. ("World view" here means a set of attitudes, beliefs, and values – an ideology – employed to explain and understand one's environment; a way of perceiving and interpreting the world.) Following from this view, science ultimately can explain and thus control anything and everything.

Depending on the theoretical framework applied, the world view underlying the construct "science" in mass communication research could range from the standard reductionist model to a conception of "science" as a socially constructed and authoritative cultural practice or institution to the marxist or critical view of "science" as a means of production, a method for reinforcing the ideology of the dominant culture, a cultural practice that justifies the existence and exercise of power and rationalizes the distribution of power.

Thomas Kuhn has asserted that "normal" science is a matter of "achieving the anticipated in a new way...." Normal science aims not to change but to reinforce the standard paradigm, to "add to the scope and precision with which the paradigm can be applied." (1970, p. 35).

The dominant scientific paradigm today, the underlying framework of assumptions about how the world works, is still the Western reductionist model. It assumes that some objective reality exists independent of human perception. According to this paradigm, normal science becomes a sort of fill-in-the-blanks form which tells scientists what they already know, need to know, and do not need to know. Scientists use the presence or absence of paradigmatic consensus to distinguish real science from "sort of" science that fails to fill in the blanks. (Gieryn 1995)

Studying boundary work -- "when, how and to what ends the boundaries of science are drawn and defended in natural settings often distant from laboratories and professional journals" (Gieryn 1995) -- is a good way of observing how scientists (and journalists, too, in this case) reinforce the dominant paradigm.

According to the dominant paradigm, science has unique and fixed qualities -- essentially Thomas Merton's standards of communism, universalism, disinterestedness, and organized skepticism (CUDOS). This concept of science is a social construction, however, a product of "ideological efforts by scientists to distinguish their work and its products from non-scientific intellectual activities." (Gieryn 1983)

Research in boundary work to date has shown how scientists make use of the media to establish and reinforce the boundaries of "real" science, debating claims and counter-claims within the "CUDOS" framework, rejecting or excluding violators of the unwritten rules governing behavior in the scientific community. (Dearing 1994, Sullivan 1994, Collins and Pinch 1995). The science establishment can label an errant scientist deviant and ultimately expel the individual; research has shown that the media can play an important role in this process of social control. (Sullivan 1994)

Researchers also have studied the kinds of rhetoric that scientists employ in doing boundary work. (Gross 1994, Sullivan 1994). And they have looked at media treatment of "maverick" science and scientists (Dearing 1994). Studies have addressed how and why scientists opt not to use the traditional science-communication methods of peer review and journal publication and go directly to the public with news. (Bucchi 1996) "Marginal crisis situations," often involving scientific boundary work, sometimes prompt scientists to bypass conventional communication routes. The public can play an important role in cases where a scientist is proposing a new theory or paradigm shift.

However, studies of boundary work apparently have not yet directly addressed a case such as John Mack's. What might happen in the case of a scientist long established as a scientific authority, a member of the scientific elite, who decides not only to engage in research that most peers seem to consider "fringe" science but also to challenge, publicly, fundamental elements of the accepted scientific world view? As Gieryn has asked (1995): "Where is the border between science and non-science? Which claims or practices are scientific? Who is a scientist? What *is* science?" Where does science leave off and society (and the media) begin? How do the media serve to enable boundary work?

Documenting boundary work is a way of mapping the evolution of the cultural authority -- the social control, the power -- of science and scientists. (Gieryn 1995) Media coverage of Mack's abduction research reveals how scientists maintain and apply their cultural authority by naming, defining, explaining, validating or rejecting; how sensitive the boundaries of science are to questions of power; and how critical the media's role is in the process of boundary work. The Mack/abduction story shows how the media work as active agents of social control, defining "visions of order, stability, and change, and...influencing the control practices that accord with these visions." (Ericson et al 1987)

Mack's claims of legitimacy and paradigm problems have prompted troops of scientists to amass along the boundaries of science. An analysis of boundary work done by Mack, his peers, and the media with regard to Mack's alien-abduction research should improve understanding of the power of scientists to define and redefine the way that people should think about the world.

The language of 'science'

"Power operates in culture through discourse" (Allen 1992) – communication in a particular social-cultural-historical context which determines specific meanings. In their discourses, scientists use rhetoric as a means of "persuasion designed to resolve the cognitive, ethical, and political dilemmas created by science through the deliberation of particular cases" -- to persuade their peers, the press, the public to accept their claims, to reinforce or to change belief or action. Thus, "rhetorical analysis provides an independent source of evidence to secure social scientific claims." (Gross 1994)

Mack has described his abduction research both within and without the framework of the reductionist scientific paradigm, relying on the language of reductionism to legitimate his work but also employing another kind of language to mark his work as a challenge to the dominant paradigm.

In an article excerpted from Abduction and published in the Washington Post (1994), Mack described the alien abduction phenomenon as something that he cannot explain psychiatrically and that is "simply not possible within the framework of the Western scientific worldview," implying that he had tried to examine the phenomenon within that framework. "I feel sometimes that in the mental health profession we are like the generals who are accused of always fighting the last war," Mack wrote, "invoking the diagnoses and mental mechanisms with which we are familiar when confronted with a new and mysterious phenomenon, especially if it is one that challenges our way of thinking." He thus emphasizes that, although he is questioning scientific norms, he is a competent scientist, a member of "the mental health profession," who knows how to do legitimate science.

Mack claims his abduction research has raised questions about essential conceptual elements of the conventional scientific world view: the origin, nature, structure, and validity of knowledge (e.g. epistemology); the nature of being (ontology); and the progress of scientific knowledge (phenomenology). In other words, he has been simultaneously participating in and deviating from the conventional scientific discourse.

Mack also addressed the subject of scientific evidence in the Post, stating that evidence in the form of emotional experience can be just as valid as evidence gathered empirically. "In physics, psychology, and other fields, the data we obtain is a function of the way we have gone about the task of gaining information. The empirical methods of Western science rely primarily on the physical senses and rational intellect for gaining knowledge, and were developed in part to avoid the subjectivity, contamination, and sheer messiness of human emotion. Yet the cost of this restricted way of knowing may be that we now learn about the physical world with only limited use of our faculties." Thus he is not rejecting empirical science, but he is saying that it is insufficient.

One especially interesting way in which Mack has responded to criticisms of his paradigm challenge is by enlisting the scholar who made "paradigm shift" a household term as an ally in legitimizing his work and his views. Mack has reported in Abduction that he asked Thomas Kuhn, a childhood friend, for advice about proceeding with his investigations. "The Western scientific paradigm has come to assume the rigidity of a theology...held in place by the structures, categories, and polarities of language, such as real/unreal, exists/does not exist, objective/subjective, intrapsychic/external world, and happened/did not happen," Kuhn told him, advising that he suspend "to the degree that I was able all of these language forms and simply collect raw information, putting aside whether or not what I was learning fit any particular worldview." (1995, p. 8) Thus Mack obtained an authority's approval to proceed with his challenge.

In his introduction to the paperback edition of Abduction, Mack has said: "Upon reviewing the text of the book with the help of colleagues, it is apparent that my growing conviction about the authenticity of these reports, together with a sense of their potential significance, resulted in a tendency to write as if the fact or reality of the experiences was established before the case had been made." (1995, p. ix) By using the passive voice common to scientific literature ("was established...had been made"), he conveys an objective stance and distances himself from his work, as a proper scientist should. "In this revised edition, I have altered the language" – not *"my"* but *"the"* language (more distancing) – "in specific places to make clear that I am reporting the experiences of the abductees as told to me and not presuming that everything they say is literally true."(1995, p. x).[10] That is, he has attempted to clarify what he does and does not believe.

In new appendices added to the paperback edition of Abduction, Mack has responded to "basic clinical scientific questions [about] the status of physical evidence, the role of subject expectation or investigator influence, the accuracy of memory, the reliability of hypnosis, and the possibility of alternative explanations."

To sum up, Mack claims his research is good science: he says he is maintaining his objectivity, he reports that he is consulting with colleagues about his work, he states that as a psychiatrist he is not qualified to deal with physical evidence, he explains how and why his methods are sound, he asserts that he has been attempting to falsify his claim, and he invites his peers to review his data. He is reaffirming the conventional boundaries of science by describing his work as real and legitimate science and reinforcing existing boundaries between his discipline and other by specifying what he is and is not qualified to do as a psychiatrist. At the same time, he is pushing the boundaries of science by claiming that the conventional scientific paradigm is inadequate to explain everything that is happening in our environment -- for example, the alien-abduction phenomenon.

The media: where's the evidence?

This analysis does not include any quantitative assessment of media criticisms of Mack because these criticisms essentially defied precise categorization. Formulation of a reasonable number of categories for content analysis, defined clearly enough to provide useful assessments, proved to be virtually impossible. (A look at some of the stories reviewed for this analysis will show how and why criticisms are extremely difficult to isolate and label with any precision....)

The earliest Boston news story found on Mack's abduction work appeared in the Globe on June 13, 1992, at the time of the MIT abduction conference. Written by science reporter David Chandler, the story was headlined "UFO 'abductees' gather at MIT; Closed conference to probe traumas." Putting "scare quotes" around "abductees,"renders the term questionable, and citing the fact that the conference is closed makes it sound secretive. The story quoted Mack: "Until 2 1/2 years ago, Harvard psychiatrist John Mack...said he was skeptical of the whole idea of UFO abductions. But after interviewing more than 60 people who say they have been kidnapped by aliens,...he said 'the information I've gotten from [abductees] is just staggering.' They tell 'consistent and powerful stories,' he said."

The story also quoted a scientist-skeptic: MIT physicist Philip Morrison, "a leading advocate of the scientific search for extraterrestrial life, said humans live in the same cultural milieu and he finds reports of striking similarities [in abduction stories] 'a faint argument'." And it quoted a harsher critic: "James Oberg, a Houston-based aerospace engineer, author and UFO debunker, said he has heard of 'complaints from people who need further counseling after they feel their memories have been screwed up by these people'. " The story did not cite any such complaints. Implications are that Mack had no evidence that abductions are real, that his research methods were questionable.

On March 20, 1994, at the time when Abduction was being published, the New York Times Magazine ran a feature about Mack, his work, and his new book. The lead paragraph alone mentioned "sex with aliens," "sperm samples," "hybrid children," and "extraterrestrials," implicitly delegitimating Mack's research. This article provided a rather sensational account of abduction stories and then raised a question about Mack's competence, in this way: "Mack's interest in these patients. and the book he was writing about them, would not have caused a stir. Except that he believed them." Author Stephen Rae noted, however, that while many people had written about human encounters with aliens, none possessed Mack's credentials.

In reviewing Mack's career, Rae continued to question Mack's competence. He reported, for example, that "of course, people thought Mack was crazy back in the early '60s, too...." That "too" implies that Mack is crazy *now*. A quote from "a friend" immediately followed, stating that Mack "really is, you know, a do-gooder," and adding that "in medical school he was the first to get into psychoanalysis, and he had not just one psychoanalysis but two." Did Rae intend to imply that being a "do-gooder" and being psychoanalyzed twice are signs that Mack was, or is, crazy? This story also included a litany of Mack's "deviant" interests: EST, holotropic breathwork, hypnosis, Eastern philosophy....

The Times Magazine story approached the question of proper evidence by consulting a well-known reductionist and a friend of Mack, astronomer Carl Sagan. The story reported that Sagan had visited Mack Program for Extraordinary Experience Research and checked out his research. While Rae did not report that Sagan had dismissed Mack's work, he did say Sagan had argued to Mack that "extraordinary claims require extraordinary evidence." Sagan told Rae that Mack "was quite content with anecdotal cases and his judgment that these people must be telling the truth because they are so extremely distraught."

While it did not criticize him directly, a Boston Herald story published shortly after the New York Times magazine piece raised questions about Mack's competence by reporting what critics were saying, including the Times. "Pointed stories in 'Psychology Today' and the New York Times have suggested that Mack is at best credulous and at worst deluded...academic reaction has veered between dismay at his forthrightness and relief that he got tenure so long ago." (McKenna 1994) This story made some attempt to balance criticisms: "What makes these [abduction] stories unusual is the linking presence of Mack, a well-respected clinician, administrator, and advocate for environmental causes. His imprimatur on these formerly derided tales has ignited huge controversy." The implication is that Mack validated the claims of abductees simply by paying attention to them.

The Herald story reported that Mack "thinks [abductees] are telling the truth. 'Something is going on that cannot simply be explained away psychologically,' he said.... 'It's an authentic mystery.... Something went on here. Something occurred to these people that affected them powerfully and is in some sense experientially real'." This story frames Mack as more properly detached from his research subject than the New York Times Magazine did by reporting, "He believed them."

The Boston Globe headlined a news item linked to the book's publication, "E.T., phone Harvard; Dr. John Mack could use the help as critics rip his research on alien abduction."[11] (Kahn 1994) The piece had a barbed and trivializing lead: "The big Mack attack has just begun. And no one has heard from the little people yet." The story cited Mack's legitimating qualifications, describing him as "a tenured Harvard professor and Pulitzer Prize-winning biographer" whose credentials "far outweigh those of any previous investigator publicly aligned with the abduction recovery movement." The story did not describe Mack's research in any significant detail.

While the Globe story was linked to the publication of Abduction, it turned out to be largely about another news story, and it was loaded with questions about Mack's competence in the form of criticisms of his methods, from hypnosis to bookkeeping. Mack's "much-publicized book...about extraterrestrial visitations," wrote Globe reporter Joseph P. Kahn, "had barely touched down in bookstores this week before it came under heavy groundfire from critics of both Mack's methodology and his UFO-friendly mindset." In one sentence, Kahn raised questions about publicity, methods, and interests.

The Globe story reported on a Time magazine feature suggesting that "Mack's work is riddled with scientific improprieties, including supplying patients with accounts of other abduction experiences before hypnotizing them." The Globe also relayed the claims of a woman who raised explicit questions about Mack's interests and methods in the Time article ("The Man From Outer Space: Harvard psychiatrist John Mack claims that tales of UFO abductions are real. But experts and former patients say his research is shoddy"; April 25, 1994). The woman, Donna Bassett, said she had posed as an abductee, lied to Mack, and persuaded him to believe her.

Kahn quoted Mack questioning his own methods: "Mack calls it 'very legitimate' to raise questions about how he has gone about recovering memories of alien encounters. In...a 1992 article in the International UFO Reporter, Mack noted that he 'had little training in hypnosis as a psychiatric resident and had virtually to teach myself.'..." Kahn also noted Mack's claims that his peers had validated his methods: "on numerous occasions...other therapists and researchers have been present to observe – and validate – the relived trauma that subjects experience under hypnosis....

Kahn closed his story with a quote from Mack: "I have this innocent confidence that if you do your own work in a comprehensive and objective way...it stands on its own. I'm not worried the attacks will silence me." Though Kahn raised numerous questions about Mack's competence, he also framed him, somewhat sympathetically, as the underdog.

The earliest Boston Herald story found on Mack was published April 19, 1994, also in conjunction with the publication of Abduction. (McKenna 1994) This story reported that "John Mack, Ph.D., Harvard psychiatrist and Pulitzer Prize-winning biographer, thinks [abductees] are telling the truth. 'Something is going on that cannot simply be explained away psychologically,' he said in an interview.... 'It's an authentic mystery.' " Mack attempted to legitimate his research: "Something occurred to these people that affected them powerfully and is in some sense experientially real.... It isn't fantasy, it isn't delusion, it doesn't match the symptoms of mental illness or post-traumatic stress disorder'...."

The Herald questioned Mack's methods by repeating an allegation, reported in Time magazine and cited by the Boston Globe, that Mack had influenced his clients to believe the had been abducted. Mack denied the charge: " 'It's certainly not a question of leading,' he said. 'These people themselves...don't believe it; they don't want to believe it." The Herald story closed with a quote from Mack's book, perhaps chosen to illustrate how his personal interests might be playing into his research: " 'My overall impression is that the abduction process is not evil, and that the intelligences at work do not wish us ill.... Rather, I have the sense -- might I say faith – that the abduction phenomenon is, at its core, about the preservation of life on Earth at a time when the planet's life is profoundly threatened. The abduction phenomenon, it seems clear, is about what is yet to come. It presents, quite literally, visions of alternative futures, but it leaves the choice to us.' "

Several news stories which were critical of Mack cited the fact that his book was a best seller and that Mack was involved in publicity tours. The Boston Globe reported that, "For Mack...these attacks on his credibility have hit a raw nerve. Mack is in the launch phase of an all-out publicity blitzkrieg ('Oprah,' '48 Hours,' People, Larry King)...." (Kahn 1994) "Publicity blitzkrieg" appears placed to reinforce "attacks on his credibility." Another Globe article, entitled "At Harvard, a higher than ever profile," actually identified Mack as "the Harvard psychiatrist who has appeared on the Oprah Winfrey show to talk about aliens." (Grunwald 1995)

In February 1996, the Boston Herald ran a short, front-page news item ("Show sends Harvard's UFO prof into orbit") about a program to be broadcast by the public-television science series "NOVA" (a Boston-based production). The program, entitled "Kidnapped By Aliens?", was to feature Mack's abduction research. The Herald reported that Mack did not like the program's treatment of his work: "The strange and sordid world of alien abduction may inspire an earthly legal battle after a TV show airs tonight purportedly debunking the work of a Harvard professor immersed in the culture of the extraterrestrial. Harvard Medical School psychiatrist John Mack, a long-time believer and investigator of alien abduction claims, calls the...broadcast 'unconscionable' and 'terribly biased'...." (Mueller 1996)

The Herald quoted a "NOVA" producer: "We felt it was our job, however unpopular, to report whatever science said about the alien abduction phenomenon.' " The story quoted Mack defending the legitimacy of his research: " 'The effect of this program is to try to discourage anybody from taking the reality of this phenomenon seriously,' Mack said yesterday. They try to dismiss it as hallucinations or distorted thinking or people being led by hypnotists, and in my view, having worked in this field, that is patently false'." Mack also indirectly explained why material evidence was lacking: " 'Alien abduction is not something that yields its secrets to conventional explanations'."

In 1996, the Globe knocked Mack once again for seeking publicity. On July 5, in a column called "Names and Faces," the paper reported that release of "Independence Day," the alien-invasion movie, "has set off a media shower over at the Program for Extraordinary Experience Research in Cambridge. PEER, headed by Harvard shrink John Mack, is the country's leading center for

167

alien-abduction research. With UFOs blitzing the covers of Time and Newsweek, everyone wants a piece of the action.... PEER executive director Karen Wesolowsi [said] 'the work we do is very serious, while this is Hollywood entertainment loaded with themes of violence and fear. We are concerned that the two not get confused.' Those concerns notwithstanding, Mack has tentative plans to appear on ABC's 'Good Morning America' Sunday to discuss post-Cold War images of the Enemy."

The Washington Post ran a story about Mack and his abduction research that cited, in two sentences, his elite credentials -- "the Harvard psychiatrist and Pulitzer Prize-winning biographer" -- his "publicity tour for his book, 'Abduction' " -- "embarrassment of the nuts-and-bolts crowd," and "evidence" framed as questionable (that is, abduction "stories" as evidence of "another consciousness"). (Vick 1995) This story quotes Mack questioning the scientific paradigm and implying that the abduction phenomenon is not likely to yield material evidence: " 'The question really to ask is, what is there in us, what worldview, if you will, are we encased in that requires that we reduce this to some kind of brain physiology?' Mack said."

The New York Times framed Mack as a thorn in the side of Harvard in raising questions about his competence. In a story headlined "Harvard officials stress the positive despite the most recent events in a year of trials" (Honan 1995), Mack's research is mentioned as one incident in "a remarkably rocky school year.... Referring to the case of John Mack, the Harvard psychiatrist who wrote a best seller on abductions by space creatures and whose professional ethics have now been questioned by a committee of his peers...Harvard provost Albert Carnesale said, 'Not one person has raised that with me as having anything to do with Harvard.' " This story thus framed Mack as possibly unethical ("whose ethics have now been questioned"), publicity-seeking (wrote not just a book but "a best seller"), and essentially disowned by his institution (Carnesale's severance of "that" from "Harvard").

A few days later, the New York Times cited Mack's case in its Sunday "Week in Review" section. In a piece headlined "Fair Harvard, please meet Geraldo," the Times again raised questions about Mack's competence, dismissing him in one sentence: "The number of sensational news stories coming from Harvard this year could easily fill an ivy-covered tabloid. First, Harvard

Medical School issued a scathing criticism of one of its own, John Mack, the Harvard psychiatrist who wrote 'Abduction,' a book giving credence to people who said they had been captured by space aliens; the nation smirked." (Bloom 1995)

On May 21, 1995, the Los Angeles Times reported on Harvard's investigation of Mack. "A year ago," the story opened, "Harvard psychiatrist John Mack cruised the talk-show circuit promoting his best-selling book about people who say they had sex with aliens." This lead trivialized Mack's research by focusing on "sex with aliens" and implicitly criticized Mack for engaging in the unscientific activity of cruising the talk-show circuit. "Before he started talking about space aliens," the story continued, "Mack was a well respected professor at Harvard Medical School. He founded the psychiatry department at Cambridge Medical Hospital, one of Harvard's teaching facilities. He won a 1977 Pulitzer Prize...." The implication is that after he "started talking about space aliens," he was no longer respected; nonetheless, Mack's elite credentials are listed to justify the reporting of this story.

Findings

This media analysis indicates that it is not only the controversial subject matter of Mack's work but also his professional status that has drawn so much critical attention in the media. By dint of his long-time Harvard affiliation, Pulitzer Prize, and expert status in his field, Mack is a member of the scientific elite. What the Mack case reveals about how scientists and journalists interact in dealing with science at the boundaries is that the status of a "maverick" scientist may affect the media treatment of that scientist by journalists and scientific peers.

News stories reviewed for this analysis reveal that journalists have found Mack's credentials -- primarily his Harvard affiliation and Pulitzer Prize -- at least as newsworthy as his research (in some cases, perhaps even more so). The news in most stories reviewed for this analysis appears to have been that a well-known scientist affiliated with a venerable institution has been behaving badly, embarrassing his peers and violating the boundaries of science. Only a few stories provided details of abduction accounts or Mack's actual work with abductees. Mack's credentials may have been the only factor keeping journalists and scientists from overtly challenging his competence and "excommunicating" him completely.[12]

Mack's own boundary-maintenance work in the media has aimed to reinforce his status as a legitimate scientist doing legitimate research: he has consistently described his alien abduction studies in terms of the conventional scientific method, relying on repeated testing, the maintenance of objectivity and disinterestedness, and peer review. At the same time, Mack has been trying to expand the boundaries of science to encompass ideas that do not fit within the reductionist paradigm.

Media criticisms of Mack have been broad and multi-faceted. A very rough attempt to sort out criticisms in the media content reviewed for this analysis indicates that questions of competence have been the most common type of criticism. Questions about competence have taken many forms, referring to Mack's methods, world view, and personal agenda; the scientific legitimacy of his work; and lack of evidence.

Questions of evidence appear to be crucial, as the conventional scientific world view is materialistic and assumes that all phenomena can be observed, while in Mack's world view spiritual, psychic, or emotional phenomena deserve the same attention as material phenomena. Critical and skeptical journalists and scientists have demanded tangible proof of Mack's claims: "real" science deals with "real" evidence.

The media have reported Mack's claim that he is a psychiatrist and an expert on the psyche, not the physical body or the physical world; that he cannot, and is not trying to, prove whether or not the physical evidence alleged abductees present is real. Thus he has addressed questions about evidence, though neither journalists nor scientists seem to have been satisfied with Mack's handling of the question. Mack repeatedly has cited the "authenticity" and "believability" of his patients' abduction accounts as evidence of the validity of these experiences, but skeptics still say "show me."

Mack's paradigm challenge, the publicity he has attracted, and his political and social concerns have drawn equal portions of criticism, going beyond the substance of Mack's work. Publication of the hardcover and paperback editions of Abduction have drawn the most media attention to

Mack's research over the past six years -- a conundrum, since most stories linked to publication dates also criticized Mack for publicizing his book. News stories have tended to frame Mack in a critical light for appearing on television talk shows to discuss his book, without explaining why he should not have engaged in this activity. Thus the media seem to be reinforcing the conventional image of a legitimate scientist as someone who stays out of the limelight.

Newspaper stories on Mack's research generally have not included much information on Mack's actual research. Some have offered judgments on it, nonetheless. Many news stories focused on, and made fun of, abductee reports of sexual experiences with aliens, likely reflecting the media's tendency to reinforce establishment values -- in this case, it seems, puritanical attitudes about anything involving the word "sex."

It is worth noting that coverage of Mack's abduction research has not really focused on science. Few, if any, of the news stories reviewed for this analysis could be identified as science stories; they were about Mack, the controversial and perhaps errant scientist, and his popular book. To sum up, rarely did the media attempt to explain Mack's research except to question his methods, perhaps due in part to the limited length of newspaper stories but also likely due in part to interest in Mack as an elite scientist gone astray.

Mack has used the media to reinforce claims that his research is good science: he says he is maintaining his objectivity, he reports that he is consulting with colleagues about his work, he states that as a psychiatrist he is not qualified to deal with physical evidence, he explains how and why his methods are sound, and he asserts that he has been attempting to falsify his claims. Not only is he reinforcing existing boundaries between his discipline and others, but also he is reaffirming the conventional boundaries of science by describing his work according to the standard scientific method. And at the same time, he is pushing the boundaries of science by claiming that the reductionist scientific paradigm is inadequate to explain everything that is happening in our environment.

In building upon this preliminary analysis, future research could include a more comprehensive search of elite newspapers, comparison of print and broadcast coverage, interviews with journalists who have written stories about Mack, interviews with Mack about media coverage of his work, a study of media treatment of elite scientists who engage in "deviant" science (such as Linus Pauling, Elizabeth Kubler Ross, Fred Hoyle), a study of how the media define and depict the concept of "science"; and a study of the role of the media in defining and maintaining a scientific elite.

In addition, a study of media treatment of psychiatry might illuminate the workings of media treatment of the Mack case. According to Michel Foucault (1988), psychiatry aims not to understand mental illness but to master it – that is, to control and discipline. Foucault has written (1995, 2d ed.) that psychiatry is an especially notable exemplification of the mutual dependence of knowledge and power; that is, psychiatry comprises a collection of disciplinary techniques and bodies of knowledge created for the purpose of social control. Mack's reports on his abduction research hint that "experiencers" may be victims of social control; ~~scientists and~~ journalists and scientists do not appear to be comfortable with this point of view.

Conclusion

Stanley Aronowitz (1988) has described the primary elements of the current discourse of science as quantitative assessment and exclusion of the qualitative, the necessity of empirical inquiry, the value-free nature of scientific knowledge, and method as the primary means of confirming scientific knowledge. "The power of science consists...in its confla~~gra~~tion of knowledge and truth." (p. vii) Thus, the body of knowledge known as "science" becomes "truth."

In the context of the discourse that defines what science is and is not and who is and is not qualified to answer these questions, it is not difficult to understand why Mack's claims regarding his alien-abduction research have prompted an outcry among peers. What has happened to Mack and his abduction research in the media can be seen as a skirmish in the so-called "science wars" that has little to do with his science and much to do with his world view, which challenges the boundaries of science.

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Mack's challenging of scientific norms comes at a time when the conventional paradigm of science is perceived to be under attack. In a key treatise of the science wars, Paul R. Gross and Norman Levitt (1994) say the so-called attack on science is rooted in "the flower power culture" of the 1960s: Higher Superstition describes these wars as "a delayed effect from all that science-hating soft stuff such as sociology and Eastern mysticism, the distrust of the establishment and anger at the military involvement in Vietnam." (Ruse 1994)

Mack admits to a long-time interest in "Eastern mysticism." He has been openly critical of the military establishment for years; he has even been arrested for protesting military policies. As an abduction researcher, he has chosen to question the soundness of the authoritative scientific world view. He is blurring the boundaries of science and making traditionalists uncomfortable.

"Normal science...is predicated on the assumption that the scientific community knows what the world is like. Much of the success of the enterprise derives from the community's willingness to defend that assumption," Thomas Kuhn has written (1970, 2d ed., p. 5). John Mack is not the first intellectual authority to question that assumption. "The World with which we are concerned is false," wrote Friedrich Nietszche; "it is not a fact but a fable and an approximation on the basis of a meager sum of observations; it is 'in flux', as something in a state of becoming, as a falsehood always changing but never getting near the truth: for – there is no 'truth'." Thus Nietzsche concluded that the mechanistic, reductionist world view of modern Enlightenment science was worthless.[13]

Physicist and science historian Gerald Holton (1992), a subscriber to the conventional scientific world view, has written that understanding science is simply a matter of acquiring the right information: that is, rectifying ignorance, filling in the mental blanks. Scientists are the people who possess the right information. Public understanding of science is important because scientific illiteracy could lead to "erroneous policy and eventual social instability," says Holton. The implication is that any challenge to the boundaries of conventional science is a challenge to the power that scientists hold to define public policy and social value – that is, to maintain their cultural authority.

Mack has said he became engaged in abduction research, and remains engaged, because he is not able to offer a scientific explanation for the phenomenon. For an expert scientist such as Mack, the challenge of investigating a phenomenon that no one can explain may be irresistible. It is beyond the scope of this analysis to judge whether Mack's abduction research is sound, "real" science. As Mack asserts that he is a psychiatrist and thus not qualified to deal with physical evidence, so this author must say that she is a mass communication researcher, not a psychiatrist, and thus not qualified to assess the legitimacy of Mack's work. What this analysis does show is how the media can play a role in qualifying and disqualifying scientists and evaluating, legitimizing, or delegitimizing scientists' claims.

Sir Francis Bacon's 16th-century adage, "Knowledge is power," is familiar today because in many important ways, knowledge still is power. At the end of the 20th century, the power of knowledge enables scientists to maintain their cultural authority as the keepers of privileged information, the ones who have the answers, the ones who are in control.

If boundary work looks at "representations of scientific practice and knowledge" in society; occurs as people contend for, legitimate, or challenge the cognitive authority of science..." (Gieryn); then the Mack case is important for scholars of boundary work to study. Until scientists of Mack's discipline and status prove it is not possible to replicate the work that he is doing, the science community will have to put up with Mack's confident trodding upon their plastic "black-box" boundaries. And the media likely will continue to frame Mack as a scientist on the boundaries, neither securely inside nor completely outside the box marked "science."

# # #

Footnotes

1. Discussion of the social construction of "science" is relatively brief in this paper. A more in-depth analysis of this subject is the subject of another paper, now in progress.

2. Hypnosis appears to have been of great interest to journalists and other scientists due to the ongoing public debate over the validity of repressed memories recalled under hypnosis.

3. As one might expect, magazine features provide far more information than newspaper stories do on both Mack's description of his research and his critics' problems with it (and him). Television talk shows were generally adversarial in their approach to Mack and his work, though they provided plenty of time for Mack to share his views. Three national magazine features and three transcripts of television talk-shows were reviewed but not assessed in this analysis. Also excluded were book reviews.

4. An attempt was made to quantify the results of this analysis by categorizing and counting criticisms, but categories could not be defined precisely enough to yield meaningful measurements.

5. A Lexis-Nexis search is not necessarily foolproof: the precise content of the database is uncertain, and there is always a possibility that a search may miss a pertinent story. The search for this analysis did not, for example, locate feature stories about Mack's abduction research in the Boston Globeand New York TimesSunday magazines.

6. Coverage of Mack's abduction research appears to have received virtually no media coverage until 1992, the year of the MIT conference. For the record, analysis of the 26 stories citing Mack found in the pre-1992 search turned up no mention of alien abductees, no stories framing Mack as anything other than a Harvard psychiatrist and an expert on psychological subjects, no criticism of Mack's theories or methods or values.

7. Mack recently published a paper on his abduction research in a peer-reviewed science journal, Psychological Inquiry: An International Journal of Peer Commentary and Review (Spring 1996, Volume 7 No. 2). Another scientific journal published a review of Abduction in 1994 (Sanford Gifford, Journal of the American Psychoanalytic Association 41(4): 1290-98). (Telephone interview with K. Wesolowski, Program for Extraordinary Experience Research, December 9, 1996.)

8. Karen Wesolowski, executive director of Mack's Program for Extraordinary Experience Research, claims it was because of the successful book-promotion campaign run by Abduction (hardcover) publisher Scribner's that the medical school initiated its investigation.

9. A comprehensive explication of "science" is the subject of another paper, currently in progress.

10. In an interview with writer C.D.B. Bryan, Mack has explained that as a psychiatrist, it is his job to be able to tell when someone is lying or telling the truth; his expertise, he has said, is "in the discrimination of mental states." (1995)

11. Mack rebutted reviewers' criticisms in a new preface written for the paperback edition of Abduction, published in May 1995: "...[I]t is important to address some of the criticisms I have received, especially the charge that the work is an example of a kind of cult of irrationality, an exercise in anti-science and unreason."

12. As Mack is still engaged in alien-abduction research, there is no reason to think that this case is closed.

13. In "Principles of a new evaluation: the will to power as knowledge" (1884-86).

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Community Structure and Mass Media Accounts of Risk

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ABSTRACT

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Studies of media coverage of risk typically rely on characteristics of individual reporters or on attributes of media organizations to predict story content and quality. While such emphases have historically been productive, they ignore the potentially profound influence of social structure on both journalists and their media organizations. In this paper, we review a literature that examines the impact of community structure on media coverage of local environmental risks. These studies conceptualize community structure as a surrogate for the distribution of power in communities, consonant with Tichenor, Donohue & Olien.

Community Structure and Mass Media Accounts of Risk[1]

One recent summer, the U.S. Environmental Protection Agency supported a series of brief sojourns in a small number of Wisconsin communities, where we interviewed newspaper editors, reporters and sources about media coverage of local Superfund sites. One such site, in downtown De Pere, WI, led us to the offices of the small weekly newspaper there, where the publisher, the editor and the newspaper's sole reporter graciously devoted their afternoon to a discussion of their coverage.

Two metal-plating facilities situated less than a half mile from each other in a downtown residential area of De Pere had been leaking chemicals into the ground for years. By the late 1980s, scientists had found elevated levels of chromium, cyanide, zinc, cadmium, lead, silver, selenium, copper and nickel in surrounding soils. Health concerns of nearby residents and the proximity of the two businesses to the Fox River and to the town's water wells culminated in the designation of the now-defunct operations as a Superfund site in 1990. Our visit to the newspaper occurred a year later.

But as our afternoon interview progressed, it became apparent that the three journalists felt we had erred in focussing on this particular Superfund site. The site was "not that important" a story given the many newsworthy activities in De Pere, they asserted. Of course the contamination needed to be cleaned up. But most residents were indifferent to the issue, the trio argued, since the site posed no real health risk to the community at large. The newspaper had published only a handful of stories about the site over the years, but the three were unapologetic. It would be irresponsible to write incessantly about the site, they asserted. Instead, they and everyone else in town were well advised to rely on De Pere's "good city government, which handles these things."

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[1] A revised version of this paper will appear as a book chapter in K. Viswanath and D. Demers, *Mass Media, Social Control and Social Change*, under contract at Iowa State University Press.

In a remarkable finale to the interview, the publisher insisted on conducting a personal tour of the scenic little community, reinforcing the intended message by adding that he hoped the tour made clear that De Pere offered much beyond contamination.

Whoa! What's going on here? Aren't journalists supposed to leap on contamination stories and worry them like pit bulls? Why does this newspaper virtually ignore a potential health risk sitting right in the middle of town? Why does it presume its readers are unconcerned? Why would it trust local government--or any government, for that matter--to "fix" the problem?

Some analysts would explain this peculiar behavior by employing the "small newspaper" defense: Weeklies, particularly, have a proclivity to act as community boosters, they would argue. Their job is not to deliver hard news but to inform residents of the small comings and goings of daily life. New babies. Visits from Aunt Ruth. Eagle Scout awards. To find real journalism, this explanation recommends, you must make your way to the large daily newspapers, the TV stations in big, metropolitan areas. In those settings, Superfund sites will indeed be on the journalistic radar screen. The pit bulls will be at large.

While these analysts have identified a common (although by no means ubiquitous) pattern--large media organizations tend to perceive their "news world" differently than do small ones--we argue in this chapter that they have isolated the wrong predictor. Underlying organizational size (and, presumably, resources) is a more basic, much more interesting variable: community structure. We posit that understanding the behavior of a news organization requires an understanding of the distribution of power in the community that the organization serves. Simply put, media organizations are not idiosyncratic features of an urban landscape; instead, they are creatures of that landscape.

This assertion is not new. We capture it directly from the work of Minnesota sociologists/communication scholars Phillip Tichenor, George Donohue and Clarice Olien and will offer our twist on their conceptual linkages below. Our novel contribution in this chapter will be to argue that such structural predictors heavily influence media coverage of environmental and health risks. That is, the role assigned to any particular media organization by its community structure will affect the ways in which it selects and frames risk stories for its readers or viewers. In recent years, we have embarked on a number of research projects in an effort to illuminate this relationship between community structure and risk coverage. We will briefly describe those results as they become relevant in the following pages.

Understanding the relationship between community structure and the construction of risk stories has merit because that linkage is often so invisible to us. Permit a couple illustrations:

Practically speaking, the reigning explanation for variance in the quality of risk coverage--as for media coverage of most topics--is individual characteristics. That is, a flawed story is assumed to be the product of a flawed reporter, a conclusion that prompts organizations of all kinds to devote resources to such things as educational workshops for journalists, informational handbooks for reporters, and awards to journalists (rarely to media organizations) for good work.

Typical of the kind of scholarship that is grounded in this individual-level assumption is a study of risk reporting in New Jersey newspapers conducted by Sandman, Sachsman, Greenberg and Gochfeld (1987). A content analysis of a sample of stories suggested deficiencies, and the team responded by surveying journalists to explore their attitudes about risk reporting, as well as their perceived need for different types of risk information. Ultimately, a subset of the investigators produced "The Reporter's Environmental Handbook" (West, Sandman & Greenberg, 1995), a how-to guide for coping with various risky situations.

We agree that individual characteristics explain some variance in risk stories. And we certainly endorse reasonable efforts to improve the abilities of individual reporters to cope with such complex tales. But this persistent focus on the individual as the sole locus of responsibility--a focus heavily legitimized by our American culture, incidentally--masks the role played by structural dimensions. We posit that individual differences typically come into play only within the boundaries drawn by more macro structures such as communities or nation-states and make the argument below that individual differences are best investigated within that macro context.

On the few occasions when more macro explanations are called into play to explain risk stories, they have often prompted a one-medium-fits all approach to understanding news work. For example, in the early to mid-1970s, scientists in universities across the country began to set up labs equipped to "combine" DNA to modify life forms. The idea proved controversial, as the communities that sheltered these universities voiced concerns about the risks posed by such a novel activity. In city after city, scientists found themselves wrestling not only with the scientific conundrums of recombinant DNA technology but also with the need to negotiate the very existence of their labs with nervous residents.

The recombinant DNA controversy was big news, and mass communication researchers hastened to explore the nature of the resulting avalanche of coverage. Those studies were well worth the time and effort; we learned, for example, that scientists were largely able to set the media agenda for this issue (Goodell, 1986), that the mainstream scientific culture was deemed a far more "legitimate" source of information than were, say, neighborhood associations or scientific outliers (Pfund and Hofstadter, 1981), and that coverage, thus, emphasized recombinant DNA as a scientific or technical problem, not as a philosophical or political one (Altimore, 1982).

But these studies treated the mass media as monolithic. That is, they assumed that understanding the behavior of one newspaper in one community provided insight into the behaviors of media organizations elsewhere. Neglecting the possibility that media behavior might vary by community was even more remarkable in this case because the community was THE locus for most of the controversies. But no one suspected that the behaviors of a newspaper or radio station in Cambridge, MA, might have been quite different from those of media organizations covering the same type of controversy in Bloomington, IN.

Finally, we rationalize this effort to link risk coverage to a more macro focus by summoning an argument offered by McLeod and Blumler (1987) in their eloquent plea a decade ago for more studies of the influence of macrosocial factors on communication. Communication is "a relationship spanning individuals or systems," they contend.

> Media institutions are intermediate agencies, standing between would-be sources of communication and would-be consumers. Thus *social system linkages are at the very heart of media systems and need to be traced for their architecture, dynamics, and effects* [italics in the original] (p.280).

In the following pages, we attempt to clarify such a social system linkage. We first articulate what we mean by community structure, then go on to posit a number of likely structural effects on mass media coverage of risk. Some of those effects will prompt a return to our earnest trio of De Pere journalists and their (almost nonexistent) coverage of a Superfund site.

Community structure

Over the years, many scholars have argued that powerful influencers of social meaning exist at the societal level. It is the basic structures and ideologies of societies, they say, that control the ways in which individuals, as well as groups, make sense of their world. Journalists--like everyone else--are very much the creatures of prevailing social norms and power structures that create and maintain those norms.

Exploring the roles of such structures empirically is difficult. But one research team, Tichenor, Olien and Donohue of the University of Minnesota, selected a structural level that was both of manageable size and crucial to the nature of most media organizations: the community. They have spent much of their careers examining the impact of community structure on journalistic decision-making by differentiating communities in terms of community "pluralism," or structural diversity.

As Tichenor, Donohue and Olien (1980) note, communities that are more pluralistic have, by definition, a larger and more diversified population, a greater number and variety of interest groups, and a more heterogeneous distribution of power bases. Less pluralistic communities, in contrast, tend to have a smaller and less diversified populations and fewer centers of power.

It is that distribution of power--not the raw size of the community, the wealth of the media organization, or the routinization of journalistic work--that confers specific roles on media organizations, the three researchers contend. Thus, such operationalizations of community structure as number of residents, degree of ethnicity, and number of businesses, churches and volunteer organizations are essentially surrogates for the degree of centralization of power in a given city or town. The goodness of fit between the concept and its operationalization has not been thoroughly examined, although face validity has been summoned in support of the link. Specifically, larger and more diversified metropolitan areas typically do harbor more decentralized power structures than do smaller cities and towns, so much so that community size alone is sometimes used as a surrogate for power distribution.

How does the distribution of power in a community confer a particular role on local media? All news media tend to serve as reinforcers of established authority, powerful interests, and mainstream values (Donohue, Tichenor & Olien, 1995; Olien, Tichenor & Donohue, 1989). So the real issue is the way in which that authority is arrayed in a community. Let's look at the two ends of the continuum:

When established authority is centralized and in the hands of an influential few--a characteristic of less pluralistic communities--news media are given roles as legitimizers of projects, builders of consensus, and instruments for tension management (Olien, Donohue & Tichenor, 1968). Decision-making in such a setting relies on precedent and tradition, and conflict among policy-makers is usually mediated interpersonally. Thus, newspapers and radio stations are not needed as communication tools for handling structural conflict. On the contrary, media organizations in homogeneous community structures must treat conflict within their geographic borders gingerly, as a public airing could threaten the existing power structure. Reporting that would point fingers at individual or institutional members of the community, that would expose local wrongdoing among the powerful, or that would raise sensitive issues would not be consistent with a consensual role.

The ultimate role of the newspaper or radio station in less pluralistic settings, then, is to help maintain the status quo by conferring legitimacy on the prevailing power structure. It plays an active role in the maintenance of community stability and works hard to prevent tension in the social fabric. Not surprisingly, such a newspaper or radio station behaves much like a community booster, as an outlet that emphasizes the good developments over the bad. Given that the media owners/operators may themselves be part of the town's power structure, all this seems quite natural both to the media organization and to others in the community.

In more pluralistic communities, however, power is likely arrayed quite differently. Here, competing groups may jostle one another for influence, and the degree of decentralization of power requires local mass media to play crucial roles as communication brokers. Struggles among several groups for influence make it difficult for community leaders and interest groups to settle conflicts through interpersonal channels. Conflict, thus, is a more routine part of public life in these communities, and negotiations among these groups often take place at the "surface" of the community. The media are important surface tools, and competing groups will use media accounts to keep track of each other and of public opinion. This results in more conflict reporting by the mass media (Olien et al., 1968, 1989; Donohue, Olien & Tichenor, 1985), and the news media in these high pluralism settings are rewarded for performing more of a "feedback" role by drawing attention to local problems (Tichenor, et. al., 1980).

As Olien, Donohue & Tichenor (1978) observe, community pluralism thus ultimately affects the configuration of information available to citizens. But how would those effects be manifested in coverage of environmental and health risks? We posit five answers to that question. Four are supported to some extent by empirical evidence; the last is more speculative.

Five structure/risk content relationships

1. Community structure influences the ways in which journalistic stories may alert readers/viewers to the presence of a local risk. One of the most important functions performed by the mass media is that of alerting members of the public to situations that may require their attention or action. Environmental and health risks certainly are among these situations, whether they be the spread of the flu through the school system or the discovery of a contaminated site on the edge of town.

When a risky situation looms in a community, the differing roles assigned to local media by the nature of the power structure can influence the way in which that risk is defined. The crux, of course, is the extent to which airing information about the risk will implicate the power structure. For example, an accidental chemical spill by a local business might be treated with kid gloves by media organizations in more homogeneous settings, but pounced on with enthusiasm by organizations in more heterogeneous communities. In each case, these wildly contrasting behaviors would be consistent with the expectations of the community itself. But they could result in very different configurations of information, about the same issue, in the two types of communities. Here are a couple examples:

Risk signaling: One way of treating a local risk issue with kid gloves would be to downplay the linkage between the event or agent and actual health implications. That is, you might dutifully report the existence of a leaking oil storage tank but would protect the owner by making no attempt to link the leak to possible health effects. In one study, we defined making such a link as a risk "signal" and hypothesized that newspapers serving low pluralism communities would be much less likely to articulate a risk linkage when confronted with a locally caused risk than would newspapers in high pluralism settings. A nine-month content analysis of 19 newspapers in 16 Wisconsin and Illinois communities purposely selected to provide variance in community pluralism bore out our hypothesis: Nearly half (48%) of the 362 stories in our study contained a risk signal, but while 54% of the stories about local contamination from high pluralism media bore such a signal, only 20% of similar stories from low pluralism media did so.

Faced with a local risky situation with health implications for local residents, in other words, newspapers in low pluralism settings provided few risk signals. Readers in these communities would have been forced to make the link between the situation and the health possibilities themselves.

Interestingly, these low pluralism newspapers were much more likely to include links to human health when they published stories about distant risks or those risks that could occur anywhere (for example, a story about ozone and air quality). The use of risk linkages in stories about threats that occur outside the community is consistent with the role imposed by a low pluralism structure: Protecting the locals is important but it is okay, even helpful, to demonstrate how bad things are far away. But the relative popularity of risk linkages in stories that discuss risks that are "everywhere" is more difficult to decipher. One possibility is that such stories provide an indirect--and thus structurally safer--way of signaling the presence of relevant health threats in the community (Griffin, Dunwoody & Gehrmann, 1995).

Problem vs. solution frame: Another strategy for maintaining community stability in the face of a risk is to frame the risk not as a problem but as *a problem being solved*. In the study briefly described above, we coded for the presence of "problem" and "solution" frames in the leads of the 362 stories and then looked to see if community structure predicted to a disproportionate use of one or the other.

A problem frame alerts the reader to a problem or danger. The lead from an Associated Press story published in the Eau Claire (WI) *Leader-Telegram* on April 15, 1991, is illustrative:

> WHITING, Ind (AP)--For more than a century, the giant Amoco Oil refinery has given this small northwest Indiana city a steady source of jobs and a solid tax base.
>
> But it has also left behind a 16-million-gallon petroleum leak that could take 20 years to clean up, and the environmental dilemma has strained relations between local residents and their major industry.
>
> "There's a lot of distrust," said Mayor Robert Bercik, whose grandfather worked at the refinery that opened 102 years ago. "People fear a big company."

In contrast, a story was coded as having a solution frame if the lead contained information about how problems or dangers are being or might be handled. For example, here's the beginning of a story published in the January 5, 1991, issue of the *Leader-Telegram*:

> Work is scheduled to resume in mid-January on the cleanup of six sites in Dunn and St. Croix counties contaminated with lead from a car battery recycling company.

Again, our conjectures were supported. Although nearly 80% of the stories in our study contained problem frames, when it came to stories about local contaminants caused by a local company, only 64% of the items in low pluralism newspapers focused on the problem compared to 76% of the items in high pluralism newspapers. Conversely, low pluralism newspapers were far more likely than high pluralism newspapers to offer solution frames: 54% of the stories about local contamination in low pluralism newspapers contained solution frames compared to 41% in high pluralism newspapers [Percentages will sum to greater than 100 because story leads could contain both problem and solution frames.] (Griffin, Dunwoody & Gehrmann, 1995).

Community structure indeed was related to the configuration of information in these 19 midwestern newspapers. Although all newspapers preferred a problem frame when covering local risks, the low pluralism newspapers were much more likely than high pluralism newspapers to place a solution frame atop their stories. This would be consistent with the conjecture that low pluralism media would make an effort to place the community in the best possible light and to frame the prevailing authorities as active and effective.

To cover or not to cover: Perhaps the most dramatic form of signaling behavior would be to avoid a risk story altogether because it could reflect badly on the local power structure. We explored that possibility in a n analysis of media coverage of a study by a nonprofit environmental research group, Inform, Inc. Inform examined industrial toxic release data for midwestern states and, in 1991, issued a report titled *Toxic Clusters: Patterns of Pollution in the Midwest*. The report concluded that industries in seven states--Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio and Wisconsin--were responsible for a disproportionately large amount of the toxic wastes released in the United States. When the report was released, Inform sent information to some 200 TV, radio and newspaper reporters in the seven-state region and staged press conferences in three of the states.

We hypothesized that a study of the 373 daily newspapers in the region covered by the report would indicate that those in low pluralism settings would be more reluctant to cover the story than would media in high pluralism communities. But this time we found no such relationship. Instead, we found a relationship between likelihood of publication and another structural variable: a measure of a community's reliance on manufacturing. The relationship was curvilinear. That is, the story was less likely to appear in communities with either low or high levels of reliance on manufacturing than in communities with medium levels of reliance, regardless of levels of pluralism.

One interpretation of these results is that the story might have been deemed not worth covering in communities with few industries (low reliance on manufacturing) but too sensitive to cover in communities highly dependent on manufacturing. If true, that interpretation would be consistent with the contention that information about health risks and related problems stemming from local contaminators is sensitive information and will be handled carefully by local media, sometimes to the extent of not running the story at all (Griffin & Dunwoody, 1995).

2. Community structure may influence the nature of contextual information included in a risk story. Just as one would expect the roles assigned by different power configurations in a community to affect the way in which a risk story is framed, so one would expect to find differences in the nature of information provided in that story. Again, the catalyst for these differences would be efforts, by media organizations in less pluralistic settings, to "protect" the local social fabric from the potentially destablilizing forces of information that could call the decisions of the prevailing power structure into question. Some examples:

Conflictive information: As Tichenor, Donohue & Olien (1980) note, higher levels of community pluralism should be associated with a willingness on the part of local media organizations to present a more conflictive, more diverse spectrum of information about an issue. Media in less pluralistic settings, in contrast, should attempt to minimize social conflict by keeping their coverage of conflictive situations to a minimum. And this is exactly what we found in a study of media coverage of a high-level nuclear waste siting controversy.

In the mid-1980s, the U.S. Department of Energy annpunced that two locations in Wisconsin were among 20 sites chosen as possible secondary sites for the nation's high-level nuclear waste repository. For five months--at which point the DOE withdrew the sites from consideration--communities sitting atop the two geologic areas in Wisconsin lived with the prospect that a high-level nuclear waste repository could be built beneath them. During that time, the DOE held hearings, and opposition to the repository was great among both citizens and state government officials.

Conflict was an obvious element of this story, so we content analyzed 374 stories from 33 communities near the two sites to examine the willingness of local newspapers to reflect the conflictive elements of the debate. A story was coded as containing conflict if it identified opposing sides and included statements or actions by each.

When we divided the communities into three pluralism levels--low, medium and high--we found that newspapers in the most homogeneous, least pluralistic level offered no hint of overt conflict in their stories, those in the medium pluralism category offered conflict in 11% of their stories, on average, and the newspapers in heterogeneous communities articulated conflictive points of view in 23% of their stories, on average (Dunwoody & Rossow, 1989).

Enterprise reporting: If a story is judged to be sufficiently important, a media organization may commit time and resources to it. Reporters at that organization can then can go beyond reactive event reporting to engage in more deliberative gathering and presentation of evidence. In the world of journalism, this is known as "enterprise" reporting, and it is more highly rewarded by both the occupation and society than is routine event reporting, as it often supplies more explanation and represents more sophisticated efforts on the part of reporters to separate truth from fiction. But a media organization that is trying to downplay the existence of a risk should avoid enterprise reporting. It may be professionally bound to cover news events such as hearings or protest meetings, but a low pluralism newspaper should engage in less enterprise reporting than a high pluralism one.

In the high level nuclear waste repository study, we found just that. Although enterprise reporting was generally rare in our 33 communities, we found that low pluralism newspapers did virtually none, while both medium and high pluralism newspapers did some; on average, 8% of the stories by newspapers in each of those categories could be defined as "enterprise" stories.

One could counter that resources--for which size is often a surrogate--explain most of this difference. But when we interviewed editors for this study, all claimed that their resources were sufficient for their needs. And our operational definition of community structure limited the influence of circulation (city) size, such that at least one small weekly newspaper was categorized as residing in a high pluralism community; that newspaper's performance was consistent in every respect with the performance of the other three high pluralism dailies in the category (Dunwoody & Rossow, 1989).

Enabling information: When journalists cover issues, do they provide readers/viewers with enough systematic detail about people, places or things to allow members of the audience to follow up if the need arises? Scholar James Lemert and colleagues label this type of detail "mobilizing information" and define it as "any information which allows action by persons willing to do so" (Lemert & Larkin, 1979:504) or as "information which allows people to act on those attitudes which they might already have" (Lemert, Mitzman, Seither, Cook & Hackett, 1977:721). Such information might include detailed identifications of individuals quoted in a story, citations to published work mentioned, or detailed information about the date, time and location of a meeting. We have relabeled this type of systematic detail "enabling information" to emphasize its non-advocacy dimensions.

Enabling information should be a particularly important component of risk stories, we argue. Risks herald possible harm to health, yet the measurement of likelihood of harm is often fraught with uncertainty. That combination may motivate audience members to learn more, and details of where a study is published or how to contact an expert identified in a story would allow individuals to begin that process.

Lemert and colleagues have found that journalists tend to eschew enabling information in stories generally but that it is even more rare in stories that highlight controversy. They speculate that enabling information may be excluded from controversial stories because journalists consider inclusion of such information to be a departure from objectivity (Lemert & Ashma, 1983). Indeed, in one study Lemert and Larkin (1979) found that adding information that would allow readers/viewers to follow up on a story was viewed by editors as something akin to an act of advocacy or endorsement.

That negative relationship between enabling details and controversy suggested to us that the impact of community structure on inclusion of enabling information in risk accounts would be both indirect and perverse. The effect would be indirect because reporters would not be reacting to the topic of risk per se but to its contentiousness. And the link would be perverse because it suggests that media organizations in low pluralism settings should be far more likely to include helpful details in risk stories than would organizations in high pluralism settings. The small-town weekly that is loath to even cover a local risk, in other words, may be more likely to provide the kind of enabling information that would allow readers to do their own information-gathering than would the large, metropolitan daily newspapers known for their enterprise reporting.

And indeed, in our study of coverage of the nuclear waste repository siting process, those differences were borne out. In the 373 stories included in that study, we located nearly 2,400 references to people, places or things for which we could measure the comprehensiveness of enabling detail. And the less pluralistic the setting for a newspaper, the more likely that newspaper was to provide sufficient detail to allow readers to follow up. While only 21% of the enabling opportunities in high pluralism newspapers were accompanied by enough detailed information to allow readers to follow up based solely on the newspaper account, 33% of the opportunities in low pluralism newspapers came so equipped (Rossow & Dunwoody, 1991).

Placing blame: Another obvious component of many risk stories is who's to blame. Whether it's the sudden appearance of a parasite in a city's water supply or the conundrum of an abandoned industrial site on the edge of town that is sending a plume of contamination slowly but inexorably into the ground water, risks often raise the inevitable question of cause. The issue of "who did it" becomes even more important in such domains as Superfund because perpetrators are asked to shoulder the expense of cleaning up.

But under what circumstances are media readers or viewers likely to learn about possible perpetrators? Are media organizations willing to point the finger at a local bad guy, particularly when he is an upstanding member of the town? Again, community structure should figure heavily in a newspaper's willingness to place blame. In a less pluralistic setting, we would expect a media organization to downplay the role of a local polluter if--as if often the case--that business is a major player in the power structure. Media organizations in more pluralistic settings, on the other hand, will be rewarded for pointing fingers. Thus a polluting paper mill in a less pluralistic setting may be protected by the media while the same business in a more pluralistic community may become a media target.

This difference in placing blame became quite apparent in a qualitative study of three Superfund sites in Wisconsin. Each site was near or within the city limits of a community and had been the focus of several years of media coverage. All were still "active" sites in the sense that local, state and federal agencies were still embroiled in cleaning them up. And the configuration of nearby communities in each case gave us some variance in community structure. We interviewed reporters, editors, and sources at each of tho three locations and analyzed coverage by nearby newspapers. Here is a brief tale about one of the sites to illustrate how media differentially levied blame:

We return to the Superfund site that began this paper: the two metal-plating shops in De Pere, WI, collectively know as the Better Brite site. Better Brite operated one of the sites as a chromium plating facilty, while the other was devoted to zinc plating. Both were leaking chemicals into the ground.

The company made some efforts in the late 1970s to contain the contamination but the state was not satisfied and, in 1980, filed suit to force Better Brite to clean up the chromium plating site. The company apparently did not comply satisfactorily with the order and, in 1985, filed for bankruptcy and halted operations at the chrome site. The zinc site eventually found another owner but was closed for good as well in 1989. Various clean up efforts have been under way throughout the 1990s, all funded by federal or state monies.

De Pere, a community of more than 15,000 on the eastern edge of Wisconsin, is served by the weekly *De Pere Journal*, which reported a 1992 circulation of about 3,500. Just north of De Pere sits Green Bay, a city of nearly 100,000. The dominant newspaper in the city is the *Green Bay Press Gazette*, with a 1992 circulation of more than 59,000. These two communities offer great variance in structure; De Pere is a low pluralism community while Green Bay ranks much higher on the pluralism scale. And their media behaviors toward the sites' former owners varied predictably.

The *Press Gazette* did not hesitate to depict the former Better Brite owners as folks who had balked at cleaning up the contaminated sites and then, by declaring bankruptcy, fled their responsibilities. But it was an entirely different matter at the *De Pere Journal*, which never mentioned the owners in stories in a way that might infer blame. In our interview at the newspaper, the staff made it clear that they felt the owners had been unfairly maligned. The family who had once owned Better Brite had been good civic neighbors, the staff said, who had run a good company. In its heyday, the plating operation had been "real successful," noted the publisher, and it was unfair to label the owners as "bad guys" as they knew nothing about the possibility of contamination at the time (Dunwoody and Griffin, 1993).

3. Individual journalists can override the influence of community structure. But it is difficult to do and can be costly. Reporters and editors are not simply pawns being moved across a community board game by the local power structure; they can and do exercise autonomy in risk coverage. But we suggest that such autonomy is tolerated only when it occurs within the boundaries of behavior articulated as acceptable by the community structure. If a reporter or editor "acts out" in ways unanticipated by community leaders or readers, he or she may face consequences.

The boundaries of acceptable behavior are widely drawn in most communities. And most autonomous journalistic acts fall well within them. For example, in our study of media coverage of the high-level nuclear waste siting controversy (Dunwoody & Rossow, 1989), we found large differences in things like the extent of enterprise reporting among high pluralism newspapers. While the average proportion of stories per newspaper devoted to enterprise was 8% in the high pluralism group, one newspaper utilized enterprise reporting in nearly 1 in 5 stories about the siting issue. Interviews with staff suggested that the editor had taken a personal interest in the issue and had decided to make it a high priority for his newspaper.

This particular editor had spent a disproportionate share of his reporting resources on covering the siting controversy. But because his newspaper was embedded in a community that sanctioned coverage of conflict and rewarded the media organization for enterprise reporting, this autonomous act was not viewed as aberrant and perhaps was even appreciated by readers.

But when autonomous behavior falls outside the boundary of what the community structure considers acceptable, an editor may get a very different reception. Something similar to this apparently happened to the editor of the *Chippewa* (Falls) *Herald-Telegram* in the course of the newspaper's coverage of the National Presto Superfund site.

Situated on land between the communities of Eau Claire and Chippewa Falls on the western edge of Wisconsin, the 325-acre National Presto site was used, from 1954 until the late 1970s, to produce metal bodies for projectiles and shells under a contract with the U.S. Department of the Army. The facility is now on DOD standby status. National Presto continues to thrive as a producer of small appliances at other plant sites and maintains its national headquarters in Eau Claire.

The DOD work generated millions of gallons of waste water, which was stored in pits and lagoons on the site. Additionally, National Presto also disposed of spent forging compound on the site. In the early 1980s, the Wisconsin Department of Natural Resources detected volatile organic compounds and heavy metals on the premises; National Presto became a Superfund site in 1984. In 1986, the DNR obtained clear evidence linking the waste to the contamination of private wells serving residents of the unincorporated town of Hallie, adjacent to National Presto, and ordered the company to begin supplying these residents with uncontaminated water. National Presto balked.

In 1990, U.S. EPA recommended that the Hallie township build its own water system to bypass the contaminated wells. Later that year (a decade after contamination had reared its ugly head), National Presto Industries received Department of Army funding to help fix the problem and announced it would make those funds available to help pay for the new water system.

At one time, National Presto was the area's biggest employer and is clearly regarded as a major corporate citizen within the communities in the area. So how do local media, then, handle the accumulating evidence that National Presto is also a bad guy? Both Eau Claire and Chippewa Falls are relatively small, homogeneous communities, so we expected to see coverage of this issue skewed in ways that would protect the company.

And indeed, that's what happened. Through the years of newspaper coverage at both the Eau Claire *Leader-Telegram* and the *Chippewa Herald-Telegram*, National Presto emerged relatively unscathed. In fact, coverage routinely ignored the company and its role, concentrating instead on the difficult political issues posed by the need for a new water supply. For readers of the two daily newspapers in the area, this contaminated site was given meaning as a kind of disembodied health risk, a community problem whose origins seemed buried in time.

But coverage at the *Chippewa Herald-Telegram* experienced something of a sea change in the late 1980s. Initial coverage earlier in the decade had all the markings of journalism in service to the status quo. The newspaper had been running very few stories about the site, and those stories rarely mentioned the company. But in 1987, a new editor came on board at the *Herald-Telegram*, and he took a different tack. National Presto's behavior made the company "a poor corporate citizen," the editor felt, and he thought his newspaper's coverage should reflect that. Subsequent stories were critical of National Presto, so much so that the company called the newspaper's publisher, a local fellow, to complain. The publisher subsequently demanded an explanation from the editor of this aberrant behavior.

The new editor's view of the role of his newspaper clearly came into conflict with the role defined for that newspaper by members of the power structure in Chippewa Falls. When stories began to criticize National Presto, not only did the company get uncomfortable but so did the newspaper's publisher! The editor had stepped over the boundaries laid out for him by the community power structure; his little daily newspaper was simply not supposed to behave that way (Dunwoody & Griffin, 1993).

4. Communities seem to confer their own unique storytelling scaffolding onto any long-running story, and risk stories are no different. Our interest in examining the impact of community structure on risk stories led us, in the early 1990s, to a study of media coverage of long-running risk issues, Superfund sites in this case. Among other things, we wanted to see how media organizations handled information about the risks posed to health when contamination hangs around for decades and how the issue is given meaning in news stories over time.

Those questions led us to an unexpected community impact on stories: To a large extent, these Superfund sites were interpreted by journalists within particular social contexts that were derived from the communities themselves. That is, journalists gave meaning to these sites by giving each a context unique to the particular community in which a site resided. Interestingly, that context had little to do with threats to health. Here are two examples:

National Presto: Recall that the unincorporated town of Hallie surrounding the National Presto site decided to resolve its water problem by building its own municipal water system, thus abandoning the private, now contaminated wells upon which residents had historically depended. Driving that very expensive decision was a complex and contentious political relationship among Chippewa Falls, Eau Claire and Hallie. Both cities coveted pieces of unincorporated Hallie and annexed when they had an opportunity. Hallie asserted its independence fiercely.

The years-long Superfund story, thus, was immediately couched by local journalists as a territorial battle among municipalities. One reporter for the Eau Claire *Leader-Telegram*, for example, characterized the National Presto Superfund story as a tale about "a township trying to preserve its identity." Another responded similarly that a large component of the story dealt with "turf battles." For most of its lifespan, the National Presto Superfund story has been a story about contested land, not about health risks.

Sheboygan River and Harbor: About 50 miles north of Milwaukee on the eastern border of Wisconsin, the Sheboygan River empties into Lake Michigan. The harbor there has long been a prominent feature of the city of Sheboygan and has served as a mecca for both commercial fishers and recreational anglers.

As far back as 1969, however, periodic tests of sediment samples suggested the presence of pollution. In 1977, the Wisconsin Department of Natural Resources detected significant amounts of polychlorinated biphenyls (PCBs) in fish taken from the river and began issuing health advisories limiting fish consumption. Continued sediment testing confirmed the presence of PCBs and such heavy metals as arsenic, lead, copper, zinc, cadmium, nickel, mercury and chromium. The PCB contamination prompted the U.S. government to place 14 miles of the lower Sheboygan River and the 96-acre harbor on the Superfund list in 1985.

PCBs rendered fish inedible in parts of the Sheboygan River and harbor. And that was a problem for Sheboygan and nearby cities, for much of their identity was tied up in commercial and sport fishing. Sheboygan Harbor has periodic runs of Great Lake trout and salmon, making sport fishing a nearly year-round enterprise. The area has long nurtured a lively commercial fishery. Offshore waters of Lake Michigan are a spawning area for whitefish, and the Sheboygan Harbor provides a nursery for these fish.

When the contamination in the river and harbor was identified in the 1970s, newsaper stories attended to possible health effects. But the focus was short-lived. Since then, local media in the Sheboygan area have shared in the effort to define the issue as an economic--not a health--one.

In these two instances, at least, communities seemed to play major roles in establishing the larger framework within which the Superfund sites would be discussed. The lengthy and contentious relationship among the communities of Eau Claire, Chippewa Falls and the township of Hallie, for example, gave meaning to the National Presto site as a territorial issue. Within that interpretive framework, the health hazards present at the site were relevant to the extent that they lent credence to motives ascribed to the actions of any single community as it "poached" on another. Similarly, the Sheboygan River and Harbor site quickly became framed as an economic issue for residents of Sheboygan. Within that context, PCBs in fish became problems for the health of the sport fishery rather than potential health hazards to local residents or tourists.

In fact, one of the most important messages that emerged from the Superfund case studies was that *Superfund stories are not risk stories.* They are not primarily--or even substantively--stories about risks to health, although Superfund sites were created primarily to signal that condition. Rather, these stories are sagas about solving community problems, sagas whose main story lines are provided by the prevailing power structure in a given community. Long-running environmental problems, thus, seem to be recast by local mass media as situational morality plays whose plots and denouement depend to a considerable degree on the nature of the community in which the drama unfolds.

5. It is possible that framing risk stories in ways that protect the stability of the community may encourage superficial, heuristic processing of risk information by readers and viewers. Many scholars (Petty & Cacioppo, 1981; Eagly & Chaiken, 1993) suggest that we are, by nature, superficial processors of information. That is, rather than systematically gathering information about an issue and then weighing its pros and cons in order to make a reasoned judgment, we rely on a variety of heuristic devices to help us make quick decisions grounded on a sparse information base. If someone labeled an "expert" offers an answer, that may be good enough. If we see an assertion more than once in the mass media, then we may be willing to conclude that it's true. An argument in which the speaker musters an array of statistics may seem more convincing than an argument without numbers. And so on.

Culturally, we value systematic over heuristic processing. And we do so because, despite its efficiency, heuristic processing relies heavily on the ability of a single characteristic (expert label, information redundancy, presence of statistics, etc.) to systematically signal the higher quality option. Not surprisingly, these characteristics are diagnostic at some times but useless at others. So we're doomed to be wrong sooner or later.

Fragmented and superficial though it is, media coverage of an issue ideally should enhance the ability of a person to process information systematically by alerting her to differing perspectives and making her aware of timely developments relevant to the issue at hand. Supplementing those alerting opportunities with enabling information would be even better.

But our studies of the impacts of community structure on media coverage of risk suggest to us that nothing is further from the media mind than constructing content in a way that would promote systematic processing among readers/viewers. Rather, community structure assigns roles to media organizations that maximize stability and quality of communication *within the power structure itself* and, on its behalf, for the community at large. And when the goal is to deflect conflict and reinforce the sense that all is well in Tarrytown, then media organizations may literally engage in communication practices that encourage superficial processing on the part of their audience.

We are reminded of that possibility when we reflect on the admonitions of the earnest trio of weekly newspaper journalists from the De Pere Journal with whom we began this chapter. They assured us that it made no sense to write about the Superfund site festering in the middle of their town because their readers were not concerned about it and their local officials were doing a fine job of taking care of it, thank you very much. Their clear intent was to maintain a sense of wellbeing among their readership. And while that feeling may be warranted in De Pere (we can bring no evidence to bear--pro or con--on the matter), any information channel that promotes a sense of stability by actively limiting access to information is nurturing the kind of heuristic reliance on experts or officials that should be anathema to thoughtful decision-making. Unfortunately, providing such truncated access is very much the role of media organizations in less pluralistic settings.

We have done no studies of the possible roles of media organizations in fostering different styles of information processing, but we think the domain is full of research possibilities.

Conclusions

Many environmental and health risks are local and long-term, making their journalistic representations primary candidates for influence by the needs of varying configurations of community structure. We describe some of these impacts in this paper, with the intent of arguing that such configurations can have profound effects on whether or not a risk is reported in the first place, on how it is framed and discussed if it indeed becomes "news," and perhaps even on the extent to which it cues its audience to be critical or sanguine about the problem.

Risk stories are not receiving unique treatment, of course. The roles assigned to media by the distribution of power in communities will influence all media accounts to greater or lesser degrees. But we have singled out media coverage of risk because, when it comes to threats to health, the stakes are high for individuals seeking information.

Risky situations are often fraught with scientific, cultural and political ambiguity. When there are conflicting notions of danger, it's not clear who is right and who is wrong. Yet it is up to the individual to sort through the conflicting statements and the complex bits of evidence to reach a decision about a potentially life-threatening situation. Individuals must work hard to gather useful information in such a morass, and it is important that they be able to "make sense" of the array of information provided to them by mediated channels, as these channels may constitute their primary sources of information.

But such a process requires an understanding of what motivates these channels to frame the reality of risk in different and sometimes conflicting ways. Evidence accumulates that people indeed judge the quality of mediated information by evaluating the credibility of channels rather than the credibility of individual sources cited in specific stories; that is, we decide whether or not to "believe" by differentiating the bad newspapers from the good, or the best national TV news program from the worst. But the bases of these credibility judgments probably have little to do with the roles played by these media organizations in community structures. We must become more savvy about the nature of the constraints levied by those roles.

Historically, academics have "made sense" of media accounts of risk by shoving responsibility for both good and bad representations onto the shoulders of the reporters. Certainly, individuals will continue to take responsibility for the accuracy and comprehensiveness of their work. But we join Blumler and McLeod (1987) in calling for more scholarly investigations of macrosocial influences on news construction. Without doubt, there is much yet to be done to promote our undestanding of the mediated construction of risk.

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